2010/1

REVIEW OF FACULTY OF ENGINEERING

Analecta Technica Szegedinensia

UNIVERSITY OF SZEGED
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SZEGED
2010.

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UNIVERSITY OF SZEGED FACULTY OF ENGINEERING

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NUMBER OF COPIES PRINTED: 200

Juhász Nyomda Szolgáltató Kft.
6771 Szeged, Makai út 4.

ISSN 1788-6392

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DETERMINATION OF THE AMINO ACID AND SOLID CONTENT IN THE RAW EWE'S MILK

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ABSTRACT

During our experiments we have performed a complete amino acid and solid content analysis from the individual milk of the three Tsigai strains and the Awassi R_1 sheep. We have taken individual milk samples on the given plants in two months of the lactation for two times. For the inspections we have used the milk of totally 14 individuals milked during one day.

1. INTRODUCTION

The sheep's milk proteins contain the essential amino acids in the sufficient quantity and proportion, so they can be considered as full protein for the human organism (Gordon and Kalan, 1978; Sawaya and Safi, 1984; Anifantakis, 1986). The sulphur-bearing and essential amino acids are present in the sheep's milk in higher proportion than in the cow's milk. This advantageous feature will be supplemented also with the better digestibility and more favourable utilisation ratio of the proteins of the sheep's milk.

During our experiments we have performed a complete amino acid and solid content analysis from the individual milk of the three Tsigai strains and the Awassi R_1 sheep. The Tsigai breed of Csóka can be found in the training farm of the Centre of the Agrarian and Technical Sciences of the University of Debrecen, the ewes of Jucu and Milking are in Balmazújváros, on the farm of the breeder, Gábor Pál and the Awassi R_1 sheep can be found at the Bakonszegi Awassi Plc.

All three Tsigai strains were of free livestock breeding, they have spent only the nights in the sheepcote. Their soiling was based on grazing, typically extensive. The supplementation of their forage was composed identically. The method of the livestock of the Awassi R_1 breed is intensive, stabled, the forage technology consists of winter and summer forage. The ewes examined by us were 3-4 years old at the beginning of the sampling and they were with lamb with the third progeny generation.

The amino acid and the solid content analysis were performed from the individual milk samples of the Tsigai and Awassi R_1 breeds. The raw milk samples were taken from the animals according to the standard MSZ EN ISO 707 : 2000 in the works, with the help of the workers of the plant. The technology of milking was not uniform. In case of the Tsigai strains the milking was carried out manually, the first milk flow was separated and the udders were completely milked. In Bakonszeg we have applied mechanical milking, the sampling was performed with a 2 × 24 position milking machine type DeLaval.

2. DETERMINATION OF THE AMINO ACID AND SOLID CONTENT

The amino acid content of the samples was defined with ion-exchange column chromatography, with a device INGOS AAA 400. For the determination of the amino acid composition of the proteins as the first step the amino acids constituting a polypeptide chain shall be released from their bonds with hydrolysis. Afterwards the separation of the amino acid

can follow with ion-exchange column chromatography. During the separation the acidic and hydrox amino acids separate from the ion-exchange column faster, while the basic amino acids more slowly and the neutral amino acids have a middle value between both extreme groups. The results of the amino acids content are shown in Table 1.

Table 1. Amino acid content in different type of sheep milk (g/100g milk)

Sample	Jucu Tsigai		Milking Tsigai		Csóka Tsigai		Awassi R_1	
Amino acid	Mean g.AA/100g milk	deviation	Mean g.AA/100g milk	deviation	Mean g.AA/100g milk	deviation	Mean g.AA/100g milk	deviation
Aspartic acid	0,31	0,02	0,33	0,05	0,30	0,01	0,38	0,02
Threonine	0,17	0,01	0,18	0,03	0,17	0,00	0,21	0,01
Serine	0,21	0,01	0,23	0,04	0,21	0,01	0,25	0,01
Glutaminic acid	0,87	0,07	0,94	0,15	0,87	0,02	1,02	0,05
Proline	0,47	0,02	0,52	0,08	0,49	0,02	0,57	0,02
Glycine	0,08	0,00	0,09	0,01	0,08	0,00	0,09	0,01
Alanine	0,15	0,01	0,16	0,02	0,15	0,00	0,18	0,01
Cysteine	0,04	0,00	0,03	0,01	0,04	0,00	0,05	0,01
Valine	0,26	0,02	0,27	0,04	0,26	0,01	0,29	0,01
Methionine	0,14	0,01	0,15	0,02	0,14	0,00	0,16	0,01
Isoleucine	0,20	0,01	0,21	0,03	0,19	0,01	0,23	0,01
Leucine	0,40	0,03	0,41	0,06	0,39	0,01	0,46	0,01
Tyrosine	0,17	0,01	0,18	0,03	0,17	0,00	0,21	0,02
Phenilalanine	0,19	0,01	0,20	0,03	0,19	0,01	0,23	0,01
Lisine	0,33	0,03	0,35	0,05	0,33	0,01	0,40	0,01
Histidine	0,11	0,01	0,12	0,02	0,11	0,00	0,13	0,01
Arginine	0,14	0,01	0,15	0,02	0,14	0,01	0,16	0,01
Tryptophan	–	–	–	–	–	–	–	–
Ammonia (NH_3)	0,06	0,01	0,07	0,01	0,06	0,00	0,70	0,00
Amount	4,32	0,30	4,62	0,70	4,30	0,11	5,12	0,19
N% x 6,25	4,43	0,30	4,75	0,70	4,38	0,13	5,26	0,20
Solid content %	15,90		15,95		14,52		18,66	

Our examination results confirm the opinions, according to which the amino acid set of the sheep's milk is biologically more valuable than that of the cow's milk (Gordon and Kalan, 1978; Sawaya and Safi, 1984; Anifantakis, 1986), which results of the bigger share of the essential amino acids.

Fenyvessy (1990) and Csapó (1992) have defined the amino acid set of the botany merino sheep and examined the alterations occurred within the lactation respectively. The results received for the amino acid amounts and the values of the essential and non-essential amino acid proportions measured by us harmonized with the results received by the mentioned authors concerning the botany merino sheep.

In case of the examination of the amino acid content the Tsigai strains can be considered as one group from the aspect of comparison, and the total amino acid content of their milk is almost 15% lower than that of the Awassi R_1 breed (Table 1.).

Table 2. Classification of amino acids according to Gergely (2000)

		Amino acids
From the point of view of nutrition biology	essential amino acids	valine, leucine, isoleucine, phenilalanine, triptophan, methionine, threonine, lisine
	semi essential amino acids	cisteine, tyrosine
	non essential amino acids	arginine, glicine, alanine, proline, serine, asparagine, glutamine, asparagine acid, glutamine acid, histidine

Gergely, 2000.

Upon examination of the proportion of the essential and non-essential amino acids, comparing our results with the essential amino acid demand determined by FAO/WHO and the amino acid composition of the sheep's milk protein it can be ascertained, that the essential amino acid content of the milk of the Tsigai strains and the Awassi R_1 breed significantly exceed the demand, so the amino acid demand of the developing organism can be completely satisfied (Figure 1.).

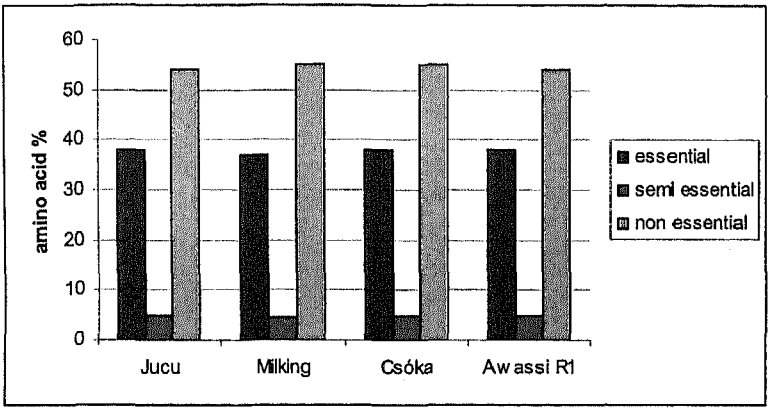

Figure 1. Classification of the amino acid content from the point of view of nutrition biology in different raw ewe's milk sample

Based on our results received during the solid matter content examination, which plays an important role from the point of view of cheese yield, it can be declared, that there is a difference also in the solid matter content between the Tsigai strains and the Awassi R_1 breed. The values of the Tsigai strains of Milking, Jucu and Csóka are similar, so they have constituted a homogeneous group. In case of the Awassi R_1 breed we have measured higher values significantly deviating from these strains (Figure 2.).

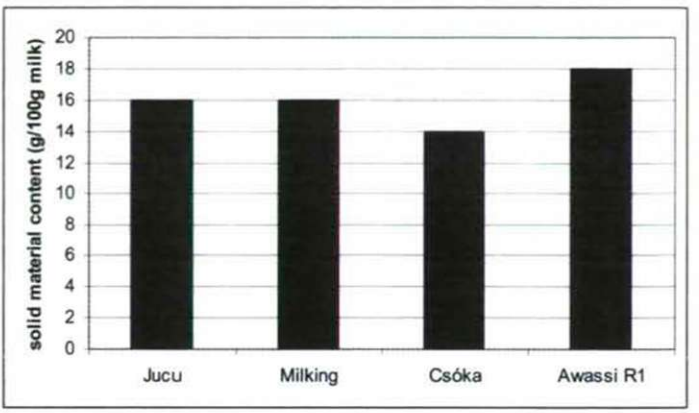

Figure 2. Solid matter content in different raw ewe's milk sample

REFERENCES

1. Anifantakis, E. M. (1986): Comparison of the physico-chemical properties of ewe's and cow's milk. In: Proceedings, IDF Seminar Production and Utilization of ewe's and goat's milk. Athens, Greece. International Dairy Federation Publ., Brussels, Belgium, Bulletin No. 202. p. 42–53.
2. Csapó J. (1992): Kérődző háziállatok kolosztrum és tejösszetétele, és néhány összetevő analitikája. Akadémiai Doktori értekezés, Kaposvár. p. 4–45.
3. FAOSTAT Database: www.fao.org, 2007.
4. Fenyvessy J. (1990): A juhtej analízise és ipari feldolgozásának lehetőségei. Kandidátusi értekezés, KÉE Élelmiszeripari Főiskolai Kar, Szeged. p. 5–112.
5. Gergely P. (2000): Szerves és bioorganikus kémia. Egyetemi tankönyv, Budapest. p. 98–103.
6. Gordon, W. G., Kalan, E.B. (1978): Protein of milk. In: Fundamentals of Dairy Chemistry. The Avi Publishing Co., Inc., Westport, Connecticut, USA. p. 87.
7. MSZ EN ISO 707 : 2000. Tej és tejtermékek. Mintavételi útmutató.
8. Sawaya W. M., Safi, W. J. (1984): Studies on the chemical composition and nutritive values of sheep milk. Milchwissenschaft 39. (2). p. 90–93.

OPTIMIZATION OF MICROWAVE PROCESS TO IMPROVE THE BIODEGRADABILITY OF MEAT PROCESSING SLUDGE

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ABSTRACT

Microwave (MW) technique is a promising process for sludge conditioning, numerous papers has verified the beneficial effects on the microbial degradation and anaerobic digestion of municipal sewage sludge, but cannot be found study specialized on the investigation of MW process with different intensities for sewage sludge generated in food industry wastewater purification technologies. Our research was focused on obtaining optimum parameters of MW pre-treatment for meat processing sewage sludge (MPSS) using solubility index (SLI) and the 5 days biodegradability index (BDI_5) as control parameters. For the modeling and optimization response surface methodology (RSM) and multiple linear regressions (MLR) were applied, respectively. The investigated factors were the irradiated MW energy (IMWE) and the specific MW power level (MWPL). The results shown, that since the large-scale biodegradability enhancement, the MW pre-treatment is suitable for MPSS conditioning. The MW pre-treatments could be advantageous in numerous process based on biological transformation, such as activated sludge recycling processes, composting and anaerobic digestion.

1. INTRODUCTION

Compared to the other industrial sectors, the food processing technologies output a great amount of wastewater because of the high water content of the raw materials processed, the commonly used dehydration operations, and in addition, the high water demand of flushing and cleaning procedures. The methods of chemical precipitation, biological treatment and their combination with mechanical processes have been widely used to purify municipal wastewater but because of the lack of biological stage in food industry wastewater management systems a large amount of sludge with high organic matter content has been also generated. Several novel technologies have been investigated to develop flexible adaptable wastewater purification and sludge management technology for food industry effluents. The dosage of added chemicals can be mitigated by membrane separation, according to the minimal processing principle (Hodúr et al., 2004). Nanofiltration (NF) in combination with advanced oxidation processes (AOP) is suitable for achieving higher capacity of membrane purification due to the reduced membrane fouling (László et al., 2009). The concentrate remained in these hybrid processes has a lower environmental load, compared to the sludge produced in a commercial precipitation wastewater purification technology. Additionally, the NF process alone can be suitable for producing recyclable process water from high surfactant contented dairy wastewater, for instance (Kertész et al., 2008).

Conventional treatment and disposal of sewage sludge involves several steps, such as anaerobic digestion, chemical conditioning, thermal conditioning, and mechanical dewatering followed by disposal as landfill, application to cropland or incineration (Tang et al., 2010). The commonly used treatment with polyelectrolyte is mentioned as an expensive method, and furthermore the added chemicals contribute to form extracellular polymeric

substance (EPS) (Higgins and Novak, 1997). Different species of microorganisms, biomass produced by the degradation of grease, nitrogen, and phosphorus; heavy metals and synthetic organic compounds agglomerated together with EPS into the polymeric network of sludge. It causes hydrophilic characteristic of sludge, and increases the difficulty to achieve effective bioconversion during anaerobic condition (AD) or aerobic processes (composting, for instance). Various alternative methods such as sonication, AOP's, freezing, electrolysis, and thermal pre-treatments have been investigated to improve dehydrate capability and the disintegration of sludge (Na et al., 2007; Yuan et al., 2010).

Many researches were focused on examining the efficiency of microwave (MW) treatment on sludge characteristic. Effects of high frequency electromagnetic field can be manifested in the change of the dipole orientation of the molecules, and it can lead to polarized side-chains of macromolecules, and the breakage of hydrogen bounds, which has an effect on biodegradability, anaerobic digestion efficiency, and disinfection ability (Hong et al., 2004; Szép et al., 2007; Toreci et al., 2009). However, several results show that the MW irradiation affected the enzyme activity as well (Neményi et al, 2008). The MW irradiation in combination with alkaline pre-treatment has a synergetic effects on the biogas generation from municipal sewage sludge (Dogan and Sanin, 2009), and the MW irradiation of sludge contented oxidizer (H_2O_2) could accelerate the decomposition of H_2O_2 into hydroxyl radicals what is manifested in enhanced organic matter solubilization and increased disintegration rate of sludge flock (Eskicioglu et al., 2008). Investigating the dewatering characteristic of MW irradiated sludge, Wojciechowska (2005) concluded that increase the exposure time beyond the optimal value the pre-treatment effects has been worsened and the specific energy consumption was notably increased.

In last decade, numerous papers have dealt with the examination of dewaterability and AD characteristic of MW irradiated sludge, but study cannot be found that specialize on the effects of MW irradiation with various power levels on the biodegradability of food industry sludge. In our work we focused on the examination, and optimization of MW pre-treatment for meat processing sewage sludge (MPSS).

2. MATERIALS AND METHODS

Dewatered (27.24 ± 1.8% TS) MPSS came from tertiary wastewater purification stage of a meat processing company located in Szeged (Hungary). Before the measurements the samples were frozen at –20 °C. The initial BOD_5 and TCOD of sludge was 112.48 ± 9.2, and 478.36 ± 6.6 [kg m^{-3}], respectively.

The MW pre-treatments were performed in a microwave cavity resonator equipped with a 700 W magnetron operating at a frequency of 2.45 GHz. The magnetron power ($P_{magnetron}$) is changeable continuously from 50 to 700 W through varying the heating voltage with a toroidal-core transformer.

For modelling and to optimize the process parameters response surface methodology (RSM) with central composite face centered (CCF) experimental design was performed using MODDE 8.0 statistical experimental design software (Umetrics, Sweden). The studied factors were the microwave power level (MWPL), and the irradiated MW energy (IMWE). MWPL (Wg^{-1}) was defined as the ratio of magnetron power to the quantity of treated sludge. IMWE was calculated as the product of magnetron power ($P_{magentron}$) and the exposure time (τ_{irr})

$$IMWE = P_{magnetron} \times \tau_{irr} [kJ] \qquad \text{Eq. (1)}$$

The selected responses were the solubilisation index (SLI) and the aerobic biodegradability for 5 days (BDI_5). The solubilization index for organic matters was determined by indirect COD measurement method

$$SLI = \frac{(SCOD/TCOD)_t - (SCOD/TCOD)_0}{(SCOD/TCOD)_0} \qquad \text{Eq. (2)}$$

where $(SCOD/TCOD)_0$ and $(SCOD/TCOD)_t$ is the solubility ratio of the untreated and MW pre-treated MPSS, respectively. The total COD (tCOD) was measured by the standard dichromate method (APHA 5250D, 1995) sampled from the total sludge. The soluble COD (sCOD) was determined after centrifugation (6000 rpm, 20 min). For the separation of the water soluble phase a 0.45 μm pore-sized disc filter (Millipore) was used.

The biodegradability index (BDI_5) was calculated by the following expression

$$BDI_5 = \frac{(BOD_t / tCOD_0) - (BOD_0 / tCOD_t)}{(BOD_0 / tCOD_0)} \qquad \text{Eq. (3)}$$

The biochemical oxygen demand (BOD_5) measurements were carried out in a respirometric BOD system at 20 °C for 5 days. To ensure the consistency of the experiments acclimatized standard microbes (BOD SEED, Cole-Parmer, U.S.) were used as inoculums for the measurements.

3. RESULTS AND DISCUSSION

The range and the levels of the experimental variables investigated, and the responses are shown in Table 1. To evaluate the reproducibility of the fitted model the experiments were conducted duplicated with six center points. In order to reduce the systematic error the run of the experiments were randomized.

Solubilization index indicates the change of water soluble fraction of sludge organic matters. Preliminary researches had reported that MW pre-treatments may disintegrate the flock structure of municipal sludge and, therefore, the solubilisation of the organic matters was enhanced (Bougrier et al., 2008; Eskicioglu et al., 2006). Because of the destruction of sludge flock, the specific surface of the sludge particles and the efficiency of biological degradation increased. In our research the effect of IMWE (from 100 kJ to 1050 kJ) and MWPE (from 0.5 to 5 Wg^{-1}) on COD solubilization efficiency were investigated. The experimental data are shown as the contour plot of fitted models.

Our results show, that increased IMWE from 100 to 500 kJ at a MWPL range of 1.5 to 4 Wg^{-1} could increase the solubility index to 0.9 (Fig. 1.). The increment of COD solubility can be explained by the hydrolysis of the large molecular weight organic compounds, the lysis of the cell walls, and the disintegration of the sludge flock, which was intensified by the applied MW irradiation. It was found, that beside the energy carried by MW irradiation, the applied MWPL had effect on the change of soluble fraction of the organic compounds of sludge as well. The lower than 2.5 Wg^{-1} MWPL was not enough to achieve the maximum organic matter solubilization.

Table 1. RSM for two variables and its experimental responses

Exp No.	Run ord.	IMWE [kJ]	MWPL [Wg^{-1}]	SLI	BDI_5
N1	5	90	0.50	0.303	0.886
N2	18	1050	0.50	0.734	1.186
N3	14	90	5.00	0.175	0.918
N4	17	1050	5.00	0.907	1.136
N5	8	90	2.75	0.253	1.005
N6	7	1050	2.75	0.903	1.246
N7	16	570	0.50	0.751	1.604
N8	20	570	5.00	0.793	1.619
N9	9	570	2.75	0.800	1.754
N10	11	570	2.75	0.798	1.749
N11	4	570	2.75	0.803	1.751
N12	15	90	0.50	0.297	0.891
N13	10	1050	0.50	0.745	1.213
N14	21	90	5.00	0.186	0.921
N15	6	1050	5.00	0.899	1.159
N16	22	90	2.75	0.267	0.991
N17	19	1050	2.75	0.902	1.259
N18	3	570	0.50	0.776	1.613
N19	13	570	5.00	0.809	1.594
N20	12	570	2.75	0.803	1.741
N21	2	570	2.75	0.801	1.76
N22	1	570	2.75	0.807	1.753

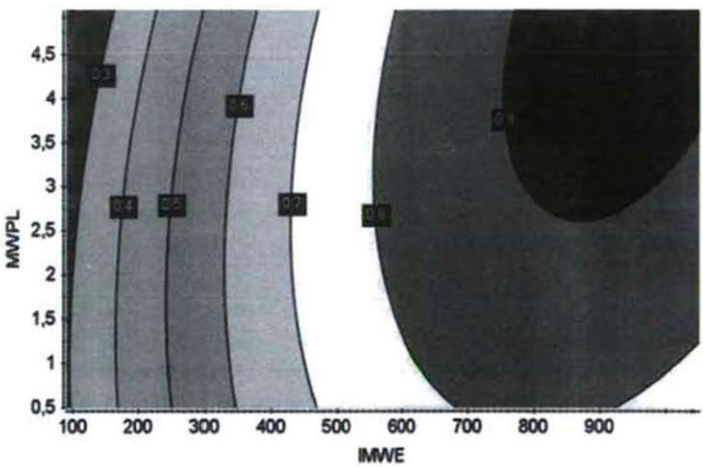

Figure 1. Contour plot of solubilization index (SLI) showing the effects of variables MWPL and IMWE

Since the biodegradability is linked to the solubility, the advantage of stronger MW irradiation predicts similar non-linear trends in the change of BDI_5, as well. But in the case of biodegradability limited increasing was found; applied MWPL over 4 Wg^{-1} and/or irradiated MW energy was more than 750 kJ the BDI_5 was worsened (Fig.2.).

The observed unfavourable effect of strong irradiation on biodegradability supposed to be due to the mineralization effects of MW heating. Furthermore, Eskicioglu et al. (2007) reported decreasing in the sugar and protein content of the soluble phase of sludge at an elevated temperature, explained by the Maillard reactions occurring between amino acids and reducing sugars. In our case the MPSS samples contained proteins with carbohydrate compounds; therefore the longer MW irradiation could manifest in Maillard reactions with a lower biodegradability.

The change of BDI_5 caused by the most efficient MW pre-treatment process parameters is corresponded to about 118% increment, relate to the biodegradability of untreated MPSS.

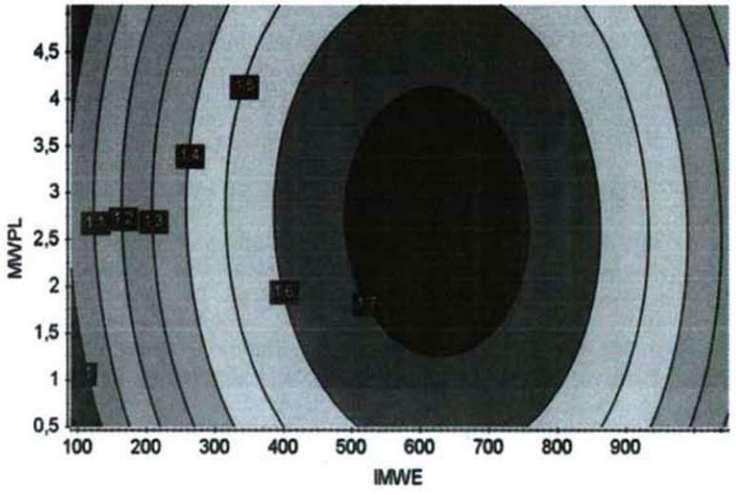

Figure 2. Contour plot of biodegradability index (BDI_5)

The applied empirical second order multiple linear regression model (MLR) for two factors was in general form according to Eq. 4. (Myers, Montgomery, 2002).

$$Y = \beta_0 + \sum \beta_i X_i + \sum \beta_{ii} X_i^2 + \sum \sum \beta_{ij} X_i X_j \qquad \text{Eq. (4)}$$

where Y is the predicted response, X_i and X_j are the independent variables (IMWE and MWPL), and β_o, β_i, β_{ii} and β_{ij} are the regression coefficients of the fitted model. Since our main object was to examine and optimize the MW pre-treatments to enhance the biodegradability of MPSS, the modelling was performed using BDI_5 as response parameter.

Based on our experimental data the fitted model for biodegradability index (BDI_5) was the following equation

$$BDI_5 = 1.7393 + 0.1323X_1 - 0.0383X_2 - 0.5959X_1^2 - 0.1137X_2^2 - 0.0208X_1X_2 \qquad \text{Eq. (5)}$$

The response function was significant at confidence level of 0.95; the R^2 for BDI_5 was 0.9976, and in addition the goodness of fit (Q^2) was 0.995, which indicate good predictive

power of the models (Fig.3.). The reproducibility was over 99.9% and the standard deviations of the fitted models were higher than the standard deviation of the residuals ($R^2_{adj} > 0.997$).

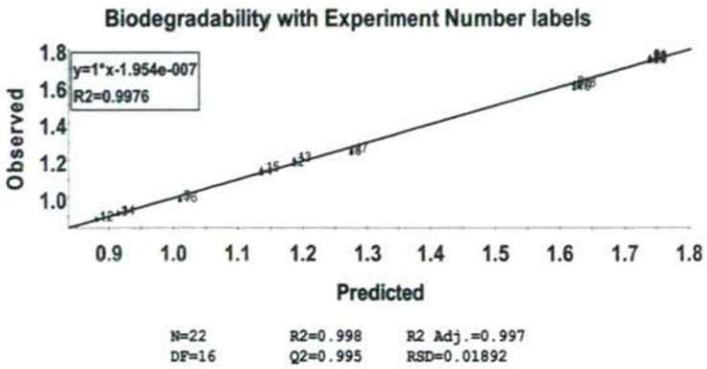

Figure 3. Observed versus predicted values for biodegradability index

Using the fitted model and based on the date obtained from the response surface analysis the optimal condition of MW process of MPSS for highest biodegradability with minimum irradiated energy and lowest MWPL were determined at IMWE of 621.9 kJ at MWPL of 2.684 Wg^{-1}. The MW pre-treatments with determined optimum process parameters caused a 114% increment of BDI_5. The final temperature of sludge irradiated with optimum parameters was about 95°C, therefore, for comparison purpose a commercial heat treatment was also carried out in laboratory heating equipment, at 95 °C for 120 min. The BDI_5 of commercial heated MPSS was obtained at 1.023 ± 0.23; also the MW pre-treatment has advantage over the conventional heating method.

4. CONCLUSION

In our work we focused on the examination of the effects of microwave (MW) pre-treatment on the solubility and biodegradability of meat processing sludge. For the experimental design and optimization MODDE 8.0 software was used, investigating the effects of the specific microwave power level (MWPL) and irradiated MW energy (IMWE) on the responses of solubility index of organic matters (SLI) and biodegradability index (BDI_5). Our results show that the MW irradiation could enhance the soluble and biodegradable fraction of MPSS and beside the IMWE the MWPL also affects the MW process. It was found, that in spite of the solubility increment, the MW pre-treatment with MWPL over 4 Wg^{-1} or IMWE over 750 kJ had an unfavorable effect on biodegradability. Using Response Surface Methodology (RSM) with Central Composite Face (CCF) centered design the optimal process parameters of MW pre-treatments were determined at IMWE of 621.9 kJ with MWPL of 2.684 Wg^{-1}. After MW pre-treatments with optimum conditions the solubility index (SLI) and biodegradability index (BDI_5) was enhanced by 194% and 117%, respectively.

Acknowledgements
The authors acknowledge the financial support provided by the project GVOP-3.2.1-2004-04/0252/3.0.

REFERENCES

1. Bougrier, C., Delgenes J. P., Carrere H. (2008): Effects of thermal treatments on five different waste activated sludge samples solubilisation, physical properties and anaerobic digestion. Chem. Eng. J. 2008:139 (2), 236–244. p.
2. Dogan I., Sanin F., D. (2009): Alkaline solubilization and microwave irradiation as a combined sludge disintegration and minimization method. Water Res. 2009:43, 2139–2148. p.
3. Eskicioglu, C., Kennedy K., J., Droste R. L. (2006): Characterization of soluble organic matter of waste activated sludge before and after thermal pretreatment. Water Res. 2006:40, 3725–3736. p.
4. Eskicioglu, C., Terzian N., Kennedy K., J., Droste, R., L., Hamoda M. (2007): Athermal microwave effects for enhancing digestibility of waste activated sludge. Water Res. 2007:41, 2457–2466. p.
5. Eskicioglu, C., Prorot, A., Marin, J., Droste R. L., Kennedy, K. J. (2008): Synergetic pretreatment of sewage sludge by microwave irradiation in presence of H_2O_2 for enhanced anaerobic digestion. Water Res. 2008:42, 4674–4682. p.
6. Higgins, M. J., Novak, J. T. (1997): Characterization of exocellular protein and its role in bioflocculation. J. Env. Eng. ASCE, 1997, 479–485. p.
7. Hodúr, C., László, Zs. (2004): Minimal Processing in Waste Water Treatment. Annale of University of Arad, Chemistry and Environmental Protection, 2004. 271–277. p.
8. Hong, M., Park, J. K., Lee, Y. O. (2004): Mechanisms of microwave irradiation involved in the destruction of fecal coliforms from biosolods. Water Res. 2004:38, 1615–1625. p.
9. Kertész, Sz., László, Zs., H. Horváth, Zs., Hodúr, C. (2008): Analysis of nanofiltration parameters of removal of an anionic detergent. Desalinaton 2008:221(3), 303–311. p.
10. László, Zs., Kertész, Sz., Beszédes, S., Hovorka-Horváth, Zs., Szabó, G., Hodúr C. (2009): Effect of preozonation on the filterability of model dairy waste water in nanofiltration, Desalination, 2009:240. 170–177. p.
11. Myers, R.H., Montgomery, D.C. (2002): Design and Analysis of experiments. 4th ed. John Wiley and Sons, USA.
12. Na, S., Kim, Y.U., Khim, J. (2007): Physicochemical properties of digested sewage sludge with ultrasonic treatment. Ultrason. Sonochem. 2007:14, 281–285. p.
13. Neményi, M., Lakatos, E., Kovács, A., Szerencsi, Á. (2008): The effect of microwave treatment on cellulase enzyme activity. Abstracts of EurAgEng-International Conference on Agricultural Engineering, 2008. 6 p., (CDROM)
14. Szép, A., Kertész, Sz., Beszédes, S., László, Zs., Hodúr, C., Szabó, G. (2007): Effect of microwave and ozone pre-treatment on biogas product of sewage sludge. Proceedings of The 14th Symposium on Analytical and Environmnetal Problems, Szeged, 24 September 2007. 200–203. p.
15. Tang, B., Yu, L., Huang, S., Luo, J., Zhuo, Y. (2010): Energy efficiency of pre-treating excess sewage sludge with microwave irradiation. Biores. Tech. 2010:101, 5092–5097. p.
16. Toreci , I., Kennedy K.J., Droste R. L. (2009): Evaluation of continuous mesophilic anaerobic sludge digestion after high temperature microwave pretreatment. Wat. Res. 2009:43, 1273–1284. p.
17. Yuan, H., Zhu, N., Song, L. (2010): Conditioning of sewage sludge with electrolysis: Effectiveness and optimizing study to improve dewaterability. Biores. Tech. 2010:101, 4285–4290. p.
18. Wojciechowska, E. (2005): Application of microwaves for sewage sludge conditioning. Water Res., 2005:39, 4749–4754. p.

INTRODUCTION OF COMPUTER AIDED METHOD IN EDUCATION OF MECHANICS AT THE FACULTY OF ENGINEERING IN UNIVERSITY OF SZEGED

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ABSTRACT

The spread of mass education in Hungary needs new methods in teaching of technical basic subjects. It is necessary because the quality of the education should be maintained in spite of the increase in the number of students.

Department of Mechanics and Technical Drawing (Mechanical Engineering Faculty of Szent Istvan University, Hungary) have developed and applied computer aided method for give out and correction mechanics homework in the full-time and distance education for the last fifteen years. Other Hungarian universities and colleges apply this method. The circle of such applied task types in the program package has been increasing continuously according to demand. First author applied a similar program package previously in Szolnok College. On the basis of experience of mechanics teachers using this method it is recommended to introduce it at the Faculty of Engineering in University of Szeged.

In the frame of this paper the authors present the method and the program, moreover they summarize their gained experiences connected to the applying of the program.

1. INTRODUCTION

The education of Mechanics has centuries-old tradition hereby the question can be reasonable: Why is necessary to deal with methodological problem in this factual field?

There is no entrance examination in certain part of faculties in Hungary (students can get in on the basis of results obtained in the secondary school). For this reason their knowledge in Mathematics and Physics are very different. Moreover the interest in technical professions is decreasing hereby the knowledge level, the basic qualification; the general erudition of students in technical higher education is very heterogeneous. Moreover the number of lectures has decreased and the freedom and independence of the students have increased in recent years.

As we can see under these circumstances the efficiency of the education and learning has been decreasing. The social background does not give the students enough motivation to get more and more knowledge. For this reason we felt it necessary to initiate so-called content compelling tools which give the possibility of independent decisions and "constrain" the student to get useful knowledge as much as possible.

These circumstances give reasons to modify the methodology of the education because the requirements cannot change. In followings it will be mainly about the full-time education. The methodology of full-time education should take into consideration the demand of distance learning as well.

As a result of spreading out of computer and the using of special programs in the field of Mechanics the content of the subject modified. Only one fundamental thing cannot

change: the user should know the theoretical ground, the conditions and methods. Therefore beside the traditional methods in calculation it should be prepared the education of different programs of mechanical content and processes in calculation.

2. MAIN MOMENTS OF THE METHODOLOGY OF THE EDUCATION

The construction of the process of the learning is in most cases inductive namely it goes from the knowledge of the more simple to the more complicated. In case of application the process is inverse because the general laws are to be applied in given example. For this reason the process is deductive. It should not only be taught general laws and methods but also their application. In this way inductive and deductive methods have to be applied in proper place of the educational process. Taking into consideration the above mentioned things the intention of every single educational phase has to be well determined and these series of intentions should form the methodological steps [3,4,5].

From another point of view determined the methodology of education: the connection between the role of teacher and the educational technology in the process of education. It can be declared concerning the role of the educational technological instruments: they can only be applied then the comprehension and learning are better than the traditional activity of the teacher. In order to determine the role of the teacher we summarized them in following manner. The charge of teacher

- is the personal teaching;
- is the giving the students a share in discovering of pleasure having the proper results;
- is to take lectures radiated personal magnetism moreover his/her lecture should enrapture the audience.

Beside these the students need greater freedom. They want to learn under less formal constrain.

3. THE APPLIED PEDAGOGICAL METHODOLOGY

Every single student has different study technique but there is a method in case of technical basic subjects which can be recommended. According to our opinion it can be summarized in the following steps:

Comprehension of principal relations and methods (lectures) → Learning of notions, fundamental laws (short tests, measurements) → Comprehension of method of application of principles, methods (practice) → Learning of methods of application (computer aided method for give out and correction mechanics homework) → Practice of methods of application (collection of examples in program package [1,2], written test) → Comprehension and learning of the relations of the whole subject-matter of instruction (examination at the end of teaching process).

Of course these steps of the process of learning cannot be separated definitely but in any case determine the general direction.

4. THE COMPUTER AIDED SYSTEM FOR GIVE OUT AND CORRECTION OF MECHANICS HOMEWORK

In this paper we deal with the computer aided method for give out and correction mechanics homework. Learning of methods of application in the full-time and distance education goes on solving homework.

The examples of homework follow the syllabus of lectures and practice and they rely on the factual material learnt here. The applied task types in the program package can be collected according to demand of user staff at the faculty. The homework develops the independent activity and the creative thinking moreover gives pleasure of creation in case of successful solution.

We compile the topics of homework so that they do contain the most important parts of the subject. The number of problems is about 4-6 per semester, namely, 2-3 weeks are available for working out of one task. In case of necessity the teachers of the department consult the students.

The most frequently used task types (various types of tasks are used in the different institutions of the higher education):

- Moment of spatial force system to certain points of space;
- Stress figures of straight and broken-line beams with mixed load;
- Planar lattice mesh structures;
- Stress figures of Gerber-beams;
- Computation of characteristics of combined cross sections;
- Dimensioning of bent beams;
- Stress calculation of rotating shafts for combined load;
- Statical undefined structures;
- Kinematical investigation of simple planar mechanisms.

In every single task type thirty-forty different structures are available moreover to every single structure has one thousand different mechanical loads and geometry. The program consists of two main parts such as teacher's and student's version. Students have the student's version of course. At the beginning of the semester, they can watch their own tasks by the aid of personal code. They can check their computational results by writing in it. If the results and partial results written in and calculated by computer are the same with the accuracy of 0.1% in the display you can read „ The result is correct" or else „ The result is faulty". In this way students can check her/his results from the beginning to the end. Having the correct results, the homework can be put in as written technical document. By the aid of the teacher's version the teacher can check the personal home works easily and quickly [6].

5. AN EXAMPLE

The load of the multi-span beam (can be seen in figure below) consists of the followings: concentrated forces and evenly-distributed load.

To be carried out:

- the values of moments at supporting points;
- the values of supporting forces;
- the maximum value of shear force;
- the maximum value of bending moment and its place measured from the origin of coordinates;

- the diagrams of the different kind of load;
- the sizes of the cross section of the beam;
- the factor of safety;
- displacement of the cross section at the appointed place.

After the giving the code and the correct result the „Help" of the program the diagrams of deformation functions of beam (displacement and rotation) appear on display, moreover the student can have the values of deformation anywhere along the beam. In this way the student can draw these diagrams to scale.

By the aid of his/her code the geometrical data of the beam and the values of the different kind of loads and the permissible normal stress will be seen on display. The code is a three-figure number given out students by the teacher.

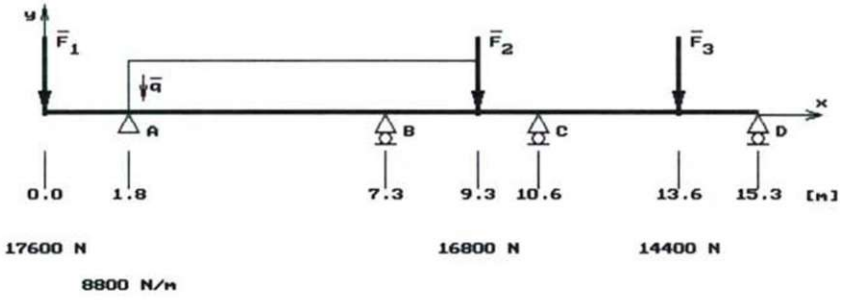

Figure 1. Geometrical model of the beam and its load

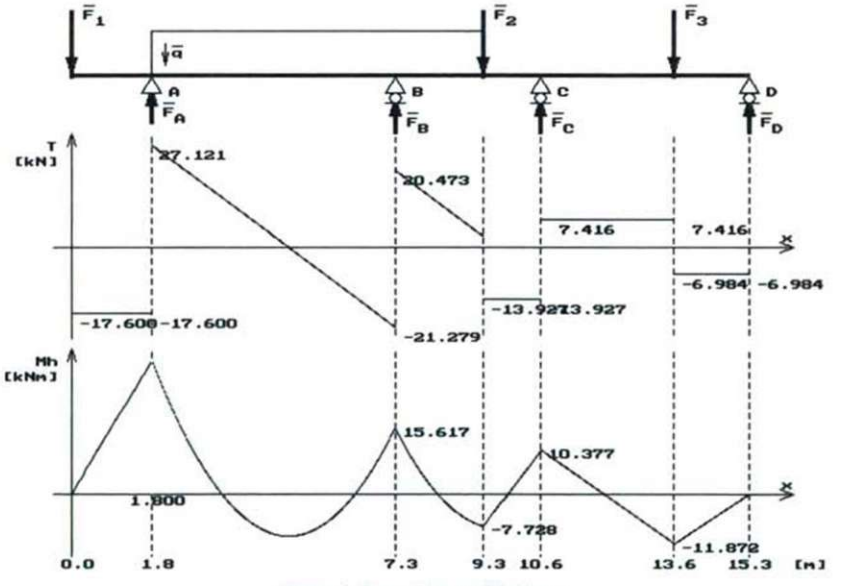

Figure 2. Stress figures of the beam

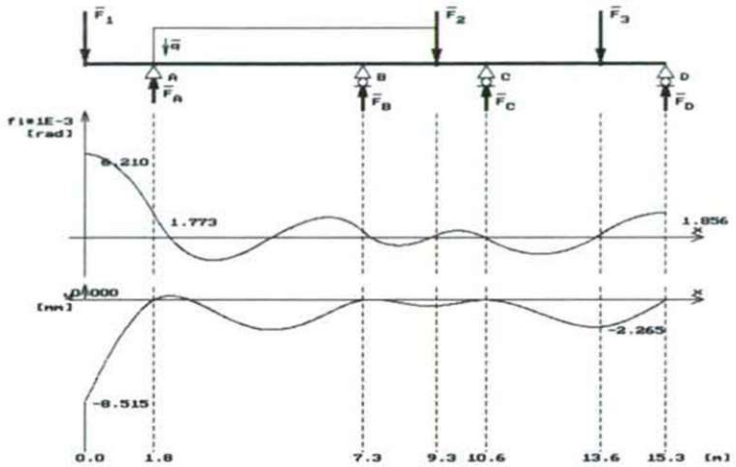

Figure 3. Deformation functions of the beam

6. EXPERIENCE OF THE APPLICATION OF THE SYSTEM

The system for give out and correction of mechanics homework was accepted by students with pleasure. According to opinion of students it is useful particularly because the results of calculations can be controlled. For this reason, they not only have a real sense of achievement but also they notice the mistakes so it helps to find easier the proper method.

This system is advantageous for teachers as well because the put in homework have no mistakes. By the aid of the detailed teacher's version, the homework can be checked easily. During the control the teachers have more time to check the logical construction of the solving and the exactitude of technical documentation.

This instrument is well defined part the educational process. It enables the greater freedom and independence for students because their activity is not fastened to time strictly and the „Help" of the program is anytime at their disposal. Simultaneously it has content compelling effect (only the proper solution can be accepted) for this reason it helps the better preparations to pass the exam.

REFERENCES

1. M. Csizmadia, B.; Nándori, E. (ed.): Mechanika mérnököknek, Statika. (Mechanics for engineers, Statics) Hungarian National Educational Publisher, Gödöllő-Budapest, 1996. p., 566., 2nd edition 1999, 3rd edition 2002.
2. M. Csizmadia, B.; Nándori, E. (ed.): Mechanika mérnököknek, Szilárdságtan. (Mechanics for engineers, Stress analysis) Hungarian National Educational Publisher, Budapest–Gödöllő–Győr, 1999., p. 576., 2nd edition 2002.
3. M. Csizmadia, B.; Müller, Z.: A számítógép a Mechanika tárgy oktatásában a GATE Gépészmérnöki Karán. (The computer in the education of Mechanics in Mechanical Engineering Faculty of Szent Istvan University) Informatics in the Higher Education, Debrecen, Vol. II., p. 810–814., 1–3. Sept. 1993.

4. M. Csizmadia, B.; Müller, Z.: Use of Computer for Helping the Studentents in Learning of the Mechanics and Strength of Materials. (A számítógép felhasználása a hallgatók tanulása segítésében a mechanika és szilárdságtan tárgyaknál), „Technical, Cultural and Spiritual Achievements in Arad Area" conference, Arad, 5–6. May 1994.
5. M. Csizmadia, B.: A távoktatási módszerek és azok megvalósítási lehetőségei a mechanika oktatásban. (Methods of distance learning and their possibilities of application in the education of Mechanics) Hungarian Higher Education, Vol. V.,Nr. 4.,1995., p 13-14.
6. Bíró, I.; Csizmadia, B.; Müller, Z.: Computer Aided Method for Give-out and Correction of Mechanics Homework. 32. Symposium der Internationale Gesellschaft für Ingenieurpedagogik. Karlsruhe, 2003. szept. 16–19., 283–286. p., ISBN 3-00-012081-5

A SIMPLE METHOD FOR OBSERVING RENNET COAGULATION IN GOAT MILK

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ABSTRACT

Renneting properties of goat milk were examined by a vibration viscometer in different renneting condition like $CaCl_2$ concentration, enzyme concentration and temperature. We observed markedly differences in the cutting time and the curd viscosity. All the increase of temperature, enzyme and $CaCl_2$ concentration caused a decrease in the cutting time and also in the curd viscosity. Our results related $CaCl_2$ addition was contrary with the literature can explain that we used raw goat milk. The use of heat treated goat milk could give different results partly which needs further experiments. The effect of the increase of renneting temperature on the cutting time equalized at 38 °C but the curd viscosity was markedly lower. Therefore the increase of renneting temperature more than 38 °C does not pay making cheese from raw goat milk. We explained a great variety in viscosity (from 80 mPas tor 600 mPas) and cutting time with different renneting condition, therefore many experiments is needed to clear the acceptable parameters of renneting. We would like to continue the work related to the cutting time predicting model.

1. INTRODUCTION

Curd is usually cut in cheese vats after a predetermined, enzymatic reaction time has elapsed or when the operator judges the curd suitable for cutting based on a subjective evaluation of textural and visual properties of the curd. Cutting the curd after a predetermined time is questionable because there are many-many factors (such properties of raw milk, heat treating, enzyme concentration, Ca^{++} concentration, clotting temperature, etc. which affect the coagulation (coagulation time, and curd firmness) of milk. Mainly the curd firmness could cause a variation in the optimum cutting time. But the optimum time of cutting is related to the working of curd, curd loss in whey, cheese yield, composition and quality of cheese, and at the end, fundamentally, to the economical cheese making.

Cutting the curd based on the subjective judgement of the operator can be accurate and acceptable if the observation and evaluation of milk gel is done properly (Hori, 1985). But, if the gel is too firm at cutting time, syneresis will be retarded, resulting high moisture and acidity in cheese. If the curd is cut too soft then cheese yield will be decreased as a result of increased loss of fat and curd fines in the whey (Hori, 1985; Payne, Hicks, & Shen, 1993a). These reasons suggest using objective methods to determinate the optimal cutting time in cheese making.

Numerous methods have been developed for observing of milk clotting. First methods based on destructive process like mechanical curd firmness testers have been proposed to measure milk coagulation parameters in cheese vats (Richardson, Okigbo, Thorpe, 1985; Ustunol, Hicks, 1990; McMahon, Brown, 1982). But these instruments are not practical moreover are not optimal in an automated on-line instrument. So, later have been several devices and instruments have been employed for monitoring coagulation parameters and/or used to determine optimum firmness for cutting.

Several methods based on optical properties of milk have also been used to follow coagulation (Guthy, Novak 1977; Hardy, Fanni 1981; McMahon, Brown, Ernstrom 1984a). More recently, changes in diffuse reflectance during cow's milk coagulation were moni-

tored using a fibre optic probe (Payne et al. 1990). Scher, Hardy (1993) studied the evolution of casein micelle mean size and turbidity after adding rennet. They found that both turbidity and mean size of casein initially decreased after adding rennet and was followed by an increase in both turbidity and particle size. Eleya et al. (1995) studied the acid coagulation of milk from cows, goats and sheep at various temperatures also by a turbidimetric method based on light reflection. Dybowska, Fujio (1996a,b) used a colorimeter for monitoring the acid-induced milk gelation. McMahon, Brown (1990) measured changes in light scattering at 600 nm in coagulating milk.

More authors using different methods found that the changes of observing properties was describable with several and typical curve and they have found that the inflexion point of these curves was correlate with flocculation time of milk and cutting time of curd (Korolczuk, Maubois, Loheac 1986, Payne et al. 1993b, Eleya et al., 1995), Lochte et al. 1998, Castillo et al. 2000, Castillo et al. 2002. So the inflexion point of curves can be use to determinate of the accurate cutting time. Mentioned methods are adequate but the purchase of these instruments is very costly, so simpler and cheaper solutions also can be acceptable.

Cow's milk has been studied more extensively than goat's milk because of its larger commercial importance. A recent increase in consumption of dairy products (especially cheese) from goat milk has motivated further research into goat's milk processing.

Our aim was to develop a simple method for determining cutting time of curd from goat milk using a commercial vibration viscometer.

2. MATERIAL AND METHODS

Raw goat bulk milk from Hungarian Native white variety (earlier Hungarian White) goats was used for experiments. The rennet coagulation was investigated in goat milk with different enzyme (from 5.0 to 30.0 µl/100 g milk), Ca^{++} concentration (0.34, 0.68, 1.02, 1.36, 1.70 mmol), and renneting temperature (30, 34, 38, 40, 42, 44, 46 °C). Crystalline $CaCl_2$ (REANAL, n:16381-1-01-38) and chimosin-pepsine enzyme mixture (Caglio Clerici Italy, 14500) were used in experiments. 10% solutions were made from $CaCl_2$ and from enzyme than the solutions were conditioned to 10 minutes at room temperature before using. The constant renneting temperature was ensured with a Memmert U-200 water bath (Germany). All experiments were repeat five-fold. The monitoring system is demonstrated in Fig. 1.

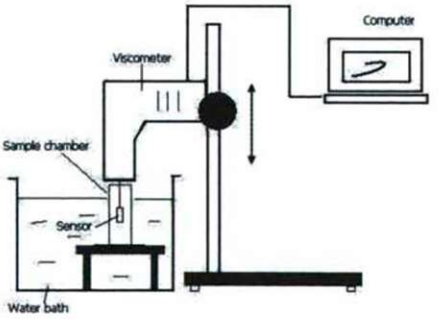

Fig. 1. Gelation properties measuring system

3. RESULTS

Similar curves were described by viscometer in every experiment. A typical curve is demonstrated in Fig. 2.

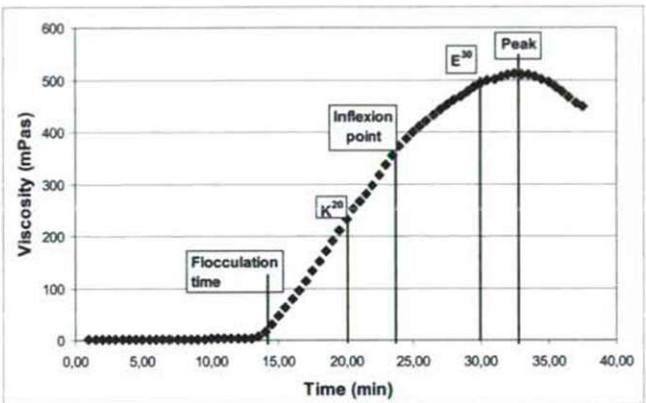

Fig. 2. Typical curves recorded by vibrating viscometer

Using the vibration viscometer we observed similar recorded curves as described in literature (Castillo et al. 2000, Castillo et al. 2002), so some specific point also could be identify. The ***Flocculation point*** is the first then the linkage among casein micelles begins. K^{20} or E^{30} as the ***Coagulation time*** which correlated the cheese yield due to the importance of curd firmness at cutting (Aleandri et al. 1989) are marked points, represent the distance in mm between the incriminate point of curve and the "X" axis in a millimetre paper measured by Formagraph. The inflexion point of curve correlate with the ***Cutting time***, so knowing the time at inflexion point (Castillo et al. 2000, Castillo et al. 2002) the cutting time is predictable. Finally, the peak at maximum viscosity was detectable simply with SV-10 viscometer and it is seems to correlate also with the cutting time from our preliminary experiments. We think that the real cutting time can be predicted using this viscometer. Therefore we investigated the correlation between the peak time and the inflexion point of curves. Temporarily we use time at the peak as cutting time.

3.1. Enzyme concentration

Increase of enzyme concentration resulted shorter maximum peak time (cutting time). Differences were remarkable resulting dramatically difference in cutting time, confirming that the selection of the optimal enzyme concentration has great importance in the GMP (Good Manufacture Practice) of cheeses. The shortest cutting time, 18.5 min. was observed at the highest concentration (300 µl enzyme solution) versus 93 min. cutting time at the smallest concentration (75 µl enzyme solution) (Fig. 3.).

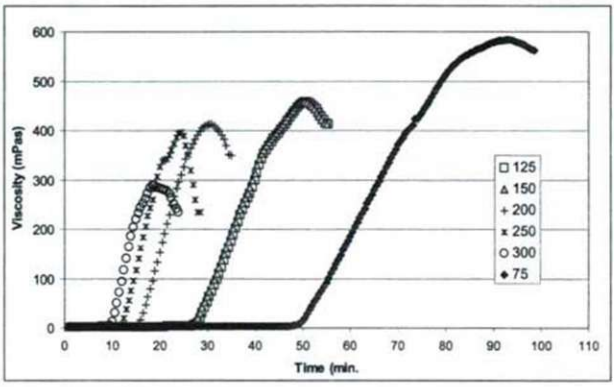

Fig. 3. The effect of enzyme concentration on the renneting

We found, that the curd viscosity at cutting time was also affected by different enzyme concentration. Higher enzyme concentration affected a decrease in the curd viscosity.

Results from the observation of the renneting of goat milk using different enzyme concentration confirm the results of Walstra (2003) partly but confirm fully the results of Nájera (2003) observing the renneting of cow milk. Our observing trend in the changing of the cutting time and in viscosity of curd agrees their results but is contrary related to curd firmness with results of Bencini (2002) investigating sheep and cow milk. Szalai (2008) also observed the increase of curd firmness up to a critical point (concentration) besides the cutting time decrease, but the further increase of enzyme concentration caused the change of the trend. Our opinion is the trend may be turn after a critical enzyme concentration.

We demonstrate the changing of the curd viscosity (curd firmness) and cutting time depending on enzyme concentration (Fig. 4.).

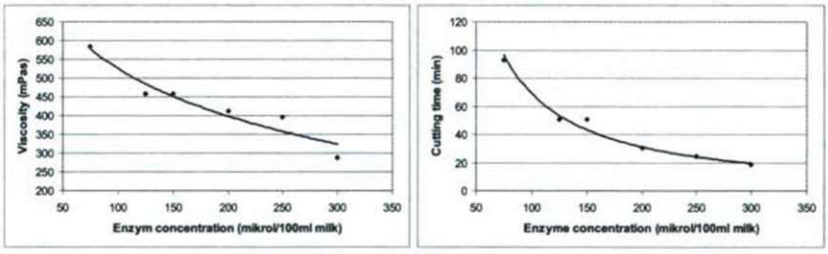

Fig. 4. Correlation of enzyme concentration with viscosity and cutting time

Both the cutting time and viscosity represents a decreasing trend in Fig. 4., but the enzyme concentration has markedly greater effect on the cutting time. This finding agrees with cited literature. As can be observe, the biggest changing occurred from 75 µl to 150 µl than the changing was smaller.

The published contrary trend in the viscosity published by Bencini (2002) can be explained by the use of heat treated cow milk in his experiments.

3.2. $CaCl_2$ concentration

Our experiments with different $CaCl_2$ concentration (Fig. 4.) resulted similar curves which were showed in Fig 3.

The increase of $CaCl_2$ concentration resulted shorter cutting time but also the decrease of viscosity. We discovered 44.5 min. cutting time in sample without $CaCl_2$ adding, but 27.0 min. in the sample adding 1,70mmol $CaCl_2$, confirming the results of Dalgleish 1983, Castillo 2002, Walstra 2006, Szakály 2001.

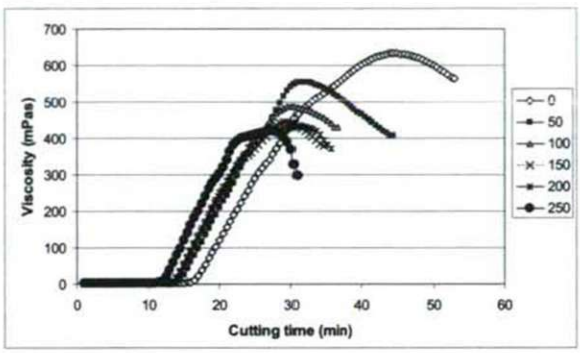

Fig. 5. The effect of $CaCl_2$ concentration on the renneting of goat milk (0–250 µl 10% $CaCl_2$ solution, 0-1,700 mmol)

The cutting time of control sample (without $CaCl_2$) represents a typical soft cheese cutting time, and the $CaCl_2$ added samples had got cutting time like semi-hard cheeses. The decrease of cutting time was strong to adding 50 µl $CaCl_2$ solution (5 µg/100 ml milk) but adding more $CaCl_2$ solution the scale of cutting time decrease was slower and was equalized in 30 min. approximately (Fig. 6.).

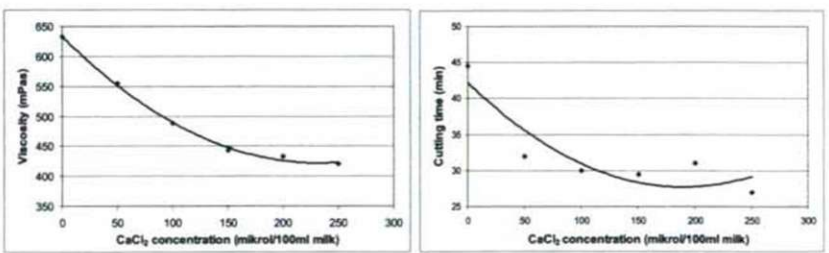

Fig. 6. Correlation of $CaCl_2$ concentration with the cutting time and the viscosity of curd

Moreover the curd viscosity decreased parallel with the cutting time decrease. The control sample represented the greatest viscosity (632,39 mPas) and the sample adding 250 µl $CaCl_2$ solution (25 µg/100 ml milk) showed the weakest curd firmness (viscosity). This finding is contrary with the result of Nájera et al. (2003) but partly agree with the result of Fenyvessy, Csanádi (2007).

Our result contrary with literature can be explained that we use raw goat milk and the use of heat treated goat milk can cause different results. These contrary results need further experiments.

3.3. Temperature

The renneting temperature of raw goat milk was changed from 30 °C to 46 °C adding 50µl $CaCl_2$ solution and 300µl enzyme solution. The registered renneting curves showed in Fig. 7.

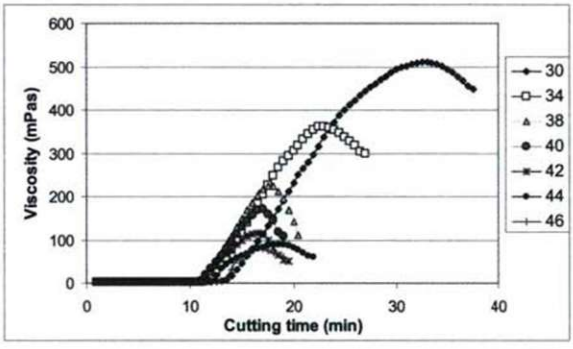

Fig. 7. The effect of temperature on the renneting of raw goat milk (50 µl 10% $CaCl_2$ solution, 300 µl 10% enzyme solution)

The temperature affected markedly on the renneting properties of raw goat milk. The lowest temperature (30 °C) resulted the longest cutting time (32.5 min.). The cutting time markedly decreased further to 38°C than seems to equalized around 17 min. The biggest change was observed between 30 and 34 °C. The enzyme properties as the heat sensitivity or/and temperature of optimum activity can have a role in the equalizing of the cutting time. It also can be possible that the inactivation of enzyme was started at 40 °C (Sholtz 2007).

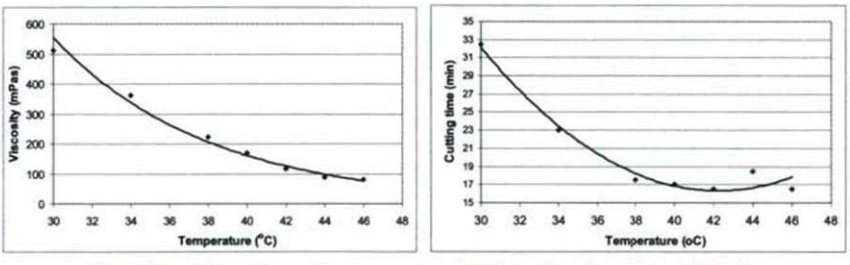

Fig. 8. Correlation of renneting temperature with the cutting time and curd viscosity

We observed the decrease of viscosity of curd setting higher temperature as we mentioned above. Sample renneted at the lowest temperature (30 °C) had the greatest viscosity (510.86 mPas), while the sample renneted at the highest temperature (46 °C) had the low-

est one (80.47 mPas) (Fig. 8.). The 16 °C temperature difference caused 6.3 fold differences in the viscosity of curd. This extreme difference in the curd viscosity is contrary the results above the cutting time changed greater than viscosity.

Our result is contrary with result of Nájera (2003) related to viscosity affected by temperature. On the other hand, our determined trend in the changing of cutting time affected by temperature agrees with the results of Walstra (2006).

3.4. Predicting of the cutting time

The shape and trend of the observed viscosity curves very similar as published in the literature (Castillo et al. 2000, Castillo et al. 2002). So we used a similar method for working out a cutting time predicting method. We present this method with results originated only from our $CaCl_2$ addition experiments.

First we used a four degree polynom for description of changes (Fig. 9.).

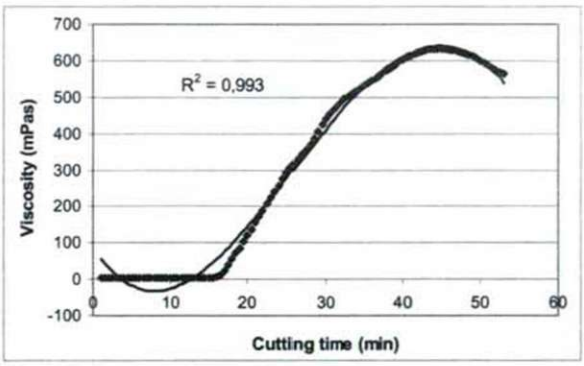

Fig. 9. The equation of viscosity change

Then we calculate the inflexion point of this polynom and after we investigated the correlation between the time at the inflexion point and the time at the maximum viscosity as cutting time (Fig. 10.).

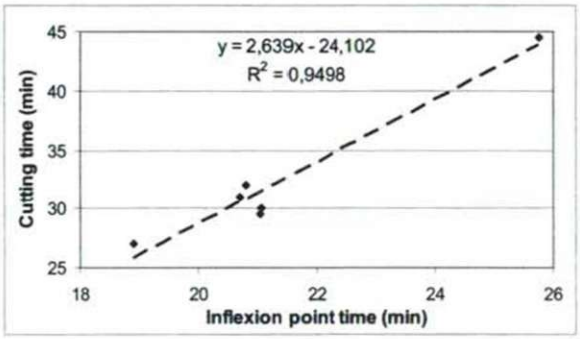

Fig. 10. Relation between the inflexion point time and the cutting time

We found a linear correlation between the inflexion point time and the cutting time. The close correlation suggests that based on further experiments can work out a common equation what is appropriate to predict the optimal cutting time of rennet curd.

4. CONCLUSION

Investigating the renneting of raw goat milk we observed markedly differences in the cutting time and the curd viscosity. All the increase of temperature, enzyme and $CaCl_2$ concentration caused a decrease in the cutting time and also in the curd viscosity.

Our results related $CaCl_2$ addition was contrary with the literature can explain that we used raw goat milk. The use of heat treated goat milk could give different results partly which needs further experiments. Based on our results it can be suggest that not the $CaCl_2$ addition is the main goal for the optimization of cutting using raw goat milk for cheese making, because this can cause a markedly decrease in curd viscosity.

Principally, the temperature and the enzyme concentration have to be well determined in the interest of the decrease of losses (curd fines) resulting higher yield and better quality. If we use $CaCl_2$ addition, using raw milk, only such a $CaCl_2$ concentration can acceptable, what is not decreases the curd viscosity dramatically, avoided the curd loss.

The effect of the increase of renneting temperature on the cutting time equalized at 38 °C but the curd viscosity was markedly lower. Therefore the increase of renneting temperature more than 38 °C does not pay making cheese from raw goat milk. More exactly, maximum 34–36 °C can be suggested as renneting temperature but very important to emphasize that the use of the optimal enzyme concentration is also principally.

Finally, we suggest that the vibration viscometer is usable to investigation of the gelation of milk, because great differences were observed in the different renneting conditions but further experiments is needed for the determination of the precise cutting time and its correlation with the curve's infelexion point time.

Acknowledgement
The purchasing of viscometer so our work also was supported by NKHT RET-07/2005 project.

REFERENCES

1. Aleandri, R., Schneider, J. C., Buttazoni L. G. (1989). Evaluation of Milk for Cheese Production Based on Milk Characteristics and Formagraph Measures. Journal of Dairy Science 72, 1967–1975.
2. Castillo M., Payne, F.A., Hicks, C.L. Lopez M.B. (2000). Predicting cutting and clotting time of coagulating goat's milk using diffuse reflectance: effect of pH, temperature and enzyme concentration. International Dairy Journal 10, 551–562.
3. Castillo, M., Payne, F. A., Hicks, C. L., Laencina, J., Lopez, M. B. (2002). Effect of calcium and enzyme in cutting time prediction of coagulating goats' milk using a light scattering sensor Inernational Dairy Journal, 12. 1019–1023.
4. Dybowska, B. E., Fujio, Y. (1996a). Effect of temperature and glucono-d-lactone (GDL) concentration on milk aggregation and gelation process as revealed by optical method. Milchwissenschaft, 51(10), 557–560.
5. Dybowska, B. E., Fujio, Y. (1996b). Effect of temperature and glucono-d-lactone (GDL) concentration on milk aggregation and gelation process as revealed by optical method. Milchwissenschaft, 51(10), 557–560.

6. Eleya, M. M. O., Banon, S. D., Hardy, J. (1995). A comparative study of pH and temperature effects on the acidic coagulation of milks from cows, goats, and sheep. Journal of Dairy Science, 78, 2675–2682.
7. Fenyvessy, J., Csanádi, J. (2007): Dairy technology (Tejipari technológia, Jegyzet Universitas Kiadó) University Publishing Szeged p. 202–204.
8. Guthy, K., Novak, G. (1977). Observations on the primary phase of milk coagulation by rennet under standardized conditions. Journal of Dairy Research, 44, 363–366.
9. Hardy, J., Fanni, J. (1981). Application of reflection photometry to the measurement of milk coagulation. Journal of Food Science, 46, 1956–1957.
10. Hori, T. (1985). Objective measurements of the process of curd formation during rennet treatment of milk by the Hot Wire method. Journal of Food Science, 50 (4), 911–917.
11. Korolczuk, J., Maubois, J. L., Loheac, J. (1986). Suivi de la coagulation- preH sure du lait à l'aide d'un nouveau capteur refractometrique. Le Lait, 66 (4), 327-339.
12. Lochte-Watson, K. R., Payne, F. A., Gates, R. S., Hicks, C. L. (1998). Effects of pH, protein, fat, and calcium on diffuse reflectance of milk. Transactions of the ASAE, 41(3), 701–707.
13. McMahon, D. J., Brown, R. J. (1982). Evaluation of Formagraph for comparing rennet solutions. Journal of Dairy Science, 65, 1639–1642.
14. McMahon, D. J., Brown, R. J., Ernstrom, C. A. (1984). Enzymic coagulation of milk casein micelles. Journal of Dairy Science, 67, 745–748.
15. McMahon, D. J., & Brown, R. J. (1990). Development of surface functionality of casein particles as the controlling parameter of enzymic milk coagulation. Colloids and Surfaces, 44, 263-279.
16. Payne, F. A., Madangopal, S., Hicks, C. L., Shearer, S.A. (1990). Fiber optic milk coagulation sensor for cut-time detection. Proceedings of the Food Processing Automation Conference AEAE, St. Joseph, MI. In: Castillo M., Payne, F. A., Hicks, C. L. Lopez M. B. (2000). Predicting cutting and clotting time of coagulating goat's milk using diffuse reflectance: effect of pH, temperature and enzyme concentration. International Dairy Journal 10, 551–562.
17. Payne, F. A., Hicks, C. L., Shen, P. S. (1993a). Predicting optimal cutting time of coagulating milk using diffuse reflectance. Journal of Dairy Science, 76, 48–61.
18. Payne, F. A., Hicks, C. L., Madangopal, S., Shearer, S. A. (1993b). Fiber optic sensor for predicting the cutting time of coagulating milk for cheese production. Transactions of the ASAE, 36(3), 841–847.
19. Richardson, G. H., Okigbo, L. M., Thorpe, J. D. (1985). Instrument for measuring milk coagulation in the cheese vats. Journal of Dairy Science, 68, 32–36.
20. Scher, J., Hardy, J. (1993). Study of the evolution of casein micelle size distribution after renneting by means of quasielastic light scattering. The Australian Journal of Dairy Technology, 48, 62–65.
21. Szalai B. (2008): Investigation of renneting of cow milk. Thesis. USZ Faculty of Engineering (Tehéntej oltós alvadásának vizsgálata. Szakdolgozat SZTE-MK), Szeged.
22. Ustunol, Z., Hicks, C. L. (1990). Effect of a coagulation monitoring device on experimental cheese yield. Journal of Dairy Science, 73, 1–7.

DEVELOPMENT ENGINEERING OF LONG-LASTING PASTRIES MADE WITH DIFFERENT TYPES OF HONEY

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ABSTRACT

A condition of staying on the global market is the presence of various products, as well as the continuous development of the already existing ones. Honey is the longest known sweetener fit for human nutrition, the consumption of which – given its high carbohydrate content – provides a significant amount of energy, too. In our experiments we studied the modification of honey-sugar ratio in blossom, silk-grass and acacia-honey.

On the basis of the sensory assessment/evaluation the following products proved to be of top quality: those with acacia-honey + silk-grass honey: 75% honey and 25% sugar; and those with acacia-honey: 50% honey and 50% sugar.

1. INTRODUCTION

Honey was the only known sweetener in Europe until the late Middle Ages. Only the rich citizens, the nobility could afford to make sugar from sugar-cane on their plantations, which was an expensive process. The development allowed the industrial production of cheap sugar from sugar beet thus the luxurious sugar became one of the popular and available consumer goods.

Hungarian honey is world-famous not only for its taste but also for the completely natural beekeeping.

During our work we study the development engineering of honey meringue. Our aim is to prepare the better quality products from the better raw materials. Each technological step is important to make a top-quality product: dough making, forming process, baking, cooling, decorating, packing and storage of the finished product. It is important to provide the consumers with a given product in appropriate packaging, retaining its quality.

In our experiments we studied the alteration of the honey-sugar ratio in flower, silk-grass and acacia-honey. We examined the effect of the honey-sugar ratio on dough making, assembly and baking parameters. We did the sensory evaluation of the finished samples using a 20-point sensory evaluation method.

2. MATERIALS AND METHODS

2.1. Materials

In our study we dealt with three different types of honey which were the following: acacia-honey, silk-grass and mixed blossom honey.

Acacia-honey: This type of honey ranges in colour from the almost clear to yellowish shades and smells like acacia flowers. The aroma is very delicate, that is why it is recommended for those who are just about to familiarize themselves with honey. It remains in a liquid state for a long period of time due to its high concentration of fructose. It is a good disinfectant and is recommended for coughs.

Silk-grass honey (silkweed honey, wild tobacco honey): It is a light-coloured, a little bit

dull type. It has a pleasant, strong smell and a vanilla flavour. The pollen content is insignificant as the plant does not produce pollen. It is ideal for those who are sensitive to pollen. It also remains liquefied for long periods just like acacia-honey.

Mixed flower honey: It is a mixed not a single type, that is it is made of the nectar of different flowers. For this reason its colour is really varied, generally with a dark shade, brown in colour. It usually goes sugary as it contains a significant amount of glucose (www.vandormehesz.hu, 2009).

Table 1. The average honey composition (Frank Renate, 2006).

Fruit-sugar (fructose) 38,2%	Enzymes 2,2,%
Grape sugar (glucose) 31,3%	Vitamins 2,2%
Maltose 7,3%	Volatile aromatic and colouring substances 2,2%
Cane sugar (sucrose) 1,3%	Amino acids 0,6%
Complex Carbohydrates (Oligo- and polysaccharides) 1,5%	Proteins 0,3%
Water 17,2%	Minerals 0,2%

2.2. Method

The honey dough is a little sticky, soft, easy to roll and form. We loosen the dough by a chemical process. During baking a gas is generated from the loosening agents added to the dough. As a consequence, the dough will have a structure full of small holes.

Preparation of the honey dough base: honey dough can be prepared both warm and cold. We filter the honey previously heated to 107 °C then it has to be cooled to 60 °C, finally we mix it with the flour. It is practical to use a 1:1 ratio of wheat and rye flour. If we use only one type of flour, then we take 4–5% more wheat flour or 4–5% less rye flour. The boiled dough must be ripened. The ripening time is 2–3 months.

Cold (raw honey dough): Warm up the honey so that it can be mixed easily with the flour but do not overheat it. You do not have to let the raw honey dough rest; you can knead the honey and the sugar dough together immediately.

Dough softening (breaking): The reason for dough softening is that the boiled honey dough is rather hard even after ripening. Dough break is done in a z-arm kneader dough-mixer.

Preparation of the sugar dough base: We produce it mixing 1:1 ratio of sugar and water. The sugar is dissolved in the water, and then heated to 107 °C. The chilled golden syrup is mixed with the wheat flour. The sugar dough can be prepared with corn syrup and starch sugar, too.

Kneading of the honey- and sugar dough: we also add other ingredients (cinnamon, clove, and anise). The loosening agents mingled with some flour are added slowly to the dough.

Dough shaping: We roll out the dough made homogeneous with the other ingredients on a wooden- or marble table covered with flour. We shape the cakes from the dough previously rolled out by stamping, cutting or moulding. The formed cakes are decorated before baking and then put on a baking plate.

Baking: The thinner, smaller cakes must be baked at 200 °C for 4–6 minutes, while the thicker, bigger pieces need 10–20 minutes at 170 °C.

Decoration: Most cakes are dressed with different materials and thus they have longer shelf-life and their appearance is better. These coatings protect the cakes from moisture as well as drying, and they become more pleasing to the eye.

To prepare the coating of honey cakes we can use coating materials made of sugar, whip and chocolate.

Packaging and storing: we market the storable pastries with honey in bulk in a packaging permeable to water vapour, or maybe in card boxes.

A storing area with a temperature of 18–20 °C and with medium humidity is suitable for their storage (Dunszt-Schulhof, 2001).

20-point sensory evaluation method: During the sensory evaluation the following characteristics are judged by points: shape, colour, appearance, consistency, smell and flavour. The evaluation of 13 samples was done by a jury of five members.

3. RESULTS

We applied different mixtures during the test series: We prepared the product using 100% sugar, as well as with 75% sugar – 25% honey, 50% sugar – 50% honey and 25% sugar – 70% honey.

The dough of the products containing 100% honey (Figure 1.) was the most difficult to mix together as it had only honey in it. The assessors were not satisfied; the consistency of the products was too hard; nevertheless, all the three types had a characteristic, honey flavour.

Figure 1. Picture of the honey biscuits made with 100% acacia-honey

As for the products made with 50% sugar and 50% honey, the ones with 50% acacia-honey content got an excellent ranking (Figure 2.), the assessors were dissatisfied with the imperfect shape only, the flavour and the aroma were sufficiently characteristic.

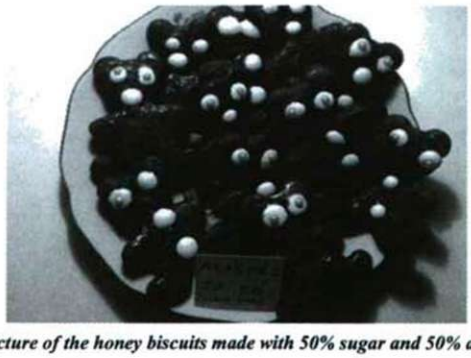

Figure 2. Picture of the honey biscuits made with 50% sugar and 50% acacia-honey

As for the mixtures of 25% sugar and 75% honey, both product made with acacia-honey and the product made with silk-weed honey got an excellent ranking. During our study we found that it required noticeably more mechanical force to knead together the honey and sugar dough. The dough was sticky during rolling. The finished products were hard; however, their flavour and aroma were sufficiently characteristic.

Figure 3. Picture of the honey biscuits made with 25% sugar and 75% silk-grass honey.

4. CONCLUSION

We judged the results and found that the more honey the products contain, the more difficult it is to work with the dough (the products are stickier); the finished products are harder, still, they are much tastier.

On the basis of the sensory evaluation the following products got the excellent ranking: 75% acacia-honey and silk-grass honey and 25% sugar, 50% acacia-honey and 50% sugar. The products made with 75% acacia-honey and 25% sugar got 18.47 total points after the sensory evaluation. The total score for the 75% silk-grass honey and 25% sugar content was 17.64 and it was 18.32 for 50% acacia-honey and 50% sugar content.

The following products got the least points: 100% acacia-honey (14.7), 100% silk-grass honey (14.5), and 75% silk-grass honey + 25% sugar (14.47). They can be ranked as medium-quality products.

As our finished products were rather hard, we intended to find out how we can make the given products softer. We stored the products in a well-closed plastic box for months. The products became softer slowly and only to a little extent. We placed apple slices in the box next to the biscuits in order to support the softening process. After some days of storage softening cold be observed, the extent of which was much higher than that found during the normal storage in the box, as the honey biscuits absorbed the moisture of the apple slices.

REFERENCES

1. Dunszt Károly-Schulhof Géza (2001): Cukrászati ismeretek I, pp. 204–208.
2. Frank Renate (2006): A csodálatos méz: gyógyító, Cser kiadó, Budapest.
3. www.vandormehesz.hu

SOME THOUGHTS ABOUT DATA AND INFORMATION

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ABSTRACT

This paper focuses on some aspects of data and information and gives a short overview based on the professional literature: Why it is necessary to collect, process and store data and information? What is the difference between the two concepts? Can they be distinguished and how? What is the role of information in the different stages of decision-making? How many ways information can be grouped and what are the main sources of the data? How much and what type of information do enterprise executives need at each leadership levels? What is an information crisis and how can it be avoided? If information is a resource of the enterprise what is its value? Does it have value at all? What are the consequences of the information explosion and how can it be handled?

NECESSITY

With the development of the manufacturing industry, with the growth and the segmentation of the organizations, the personal control performed by the executives and managers no longer correspond to today's requirements. Formal information like accounting and statistical reports came to the front and became regular (Susánszky, 1985). The effective business information available at the proper time is not only necessary for success, but it is a requirement of survival too in today's rapidly changing environment (Lönnqvist, Pirttimäki, 2006).

In addition to the traditional resources, data and information have been available as new resources for several decades. Data is the heart of the organization. Without converting the data to the appropriate form, namely information, the executives and managers cannot make good decisions (Hannon, 2005).

INTERPRETATION

The interpretation of data and information and their relation to each other have been under the examination of several researchers for a long time.

The concept of information is probably interpreted most widely by the devotees of the reflection theory. According to their view, information is the reflection of reality (Horváth, 2002). The broad interpretation is also professed by those who are engaged in the mathematical theory of information. The information theory works with mathematical concepts which try to describe information, or to be more precise, describe the quantity of information with the help of mathematics (Cullmann et al., 1973).

Although the data and the information are used as synonyms in everyday life as well, several authors and researchers try to separate the two concepts almost mandatorily in accordance with some aspects (Halassy, 1994). Researchers generally use the following characteristics to separate information from data:

- processing (Jánoki, Kocsis, 1986) (Dinya, 1987) (Kacsukné, Kiss, 1999) (Varga, 2003) (Tarnóczi, 2008) (Szekeres, 2004),
- novelty, new knowledge (even for a machine) (Berey, Dobos, 1986) (Dinya, 1987) (Gábor, 1993) (Tarnóczi, 2008),

- reducing uncertainty (Dinya, 1987) (Chikán, 2005) (Tarnóczi, 2008),
- communication. (Boros, 1995)

As it can be seen from the above list, there are several factors which can help to separate data from information. But if human factors, like subjectivity and thinking are also distinguishing marks of information (Cullmann et al., 1973) (Alföldi, Straub, 1988) (Z. Karvalics, 2004), separating two concepts unequivocally from each other may become very difficult, or as a matter of fact, impossible.

ROLE IN DECISIONS

Several authors mention the role of information (or sometimes data) in decision-making. (Dunajszki et al., 1970) (Dinya, 1987) (Kacsukné, Kiss, 1999) (Horváth, 2002) (Szekeres, 2004) (Chikán, 2005) Information has a defining role at all the stages of decision-making:

- The decision-making process starts with information recording.
- This is followed by the gathering and analysis which allows the identification of the situation.
- The development of strategies, goals and action alternatives are all based on information.
- The implementation of the decisions is actually transforming information into actions. (Enyediné, 1997)

GROUPS AND SOURCES

Business organizations always need information. The information dependency affects all aspects of their operation.

On the one hand, information necessary for management decision-making can be data which are required regularly to manage an enterprise. These data can be constantly found in the financial, the accounting, the statistical records and other parts of the internal reporting system of the enterprise (such as detailed data of production, inventories, supplier, sales, customer, financial situation, assets etc.). On the other hand there are pieces of information which managers need only occasionally to support some of the business decisions (such as information about the company performance or company and market assessment).

Dunajszki et al. grouped the information emerging during the existence of an enterprise in 1970 as: trade, statistics, development, accounting, engineering, product and economic analysis (Dunajszki et al., 1970).

In the 1970's Berey and Dobos categorized the information by the types of activity, the flow of direction, the usability, the form, the frequency and the manner of publication (Berey, Dobos, 1979). The origin can be: written, oral or visual source (Berey, Dobos, 1986).

Chikán classifies the information into three groups based on the impact made on the deicision-maker. Thus there is: semantic information which affects the selectable alternatives of the decision maker; pragmatic information which inspire to implement one of the alternatives; motivation information which is influenced by the values of the decision maker and the values of the achieved results (Chikán, 1978).

Kindler writes about fact information and value information. Fact information is natural, numerical data from the past and the present about the organization and the environment which become information after processing. During the processing fact information flow toward different areas of the organization, generally up, towards the chief executives and

then back down again. This type of information can be well handled by computer aided information systems from the outset. Value information means interests, preferences, goals, knowledge and abilities of the decision-makers and the whole organization. People have different information processing capabilities and limits of rationality. These are all factors which make handling and transforming value information much more difficult than processing fact information (Kindler, Kiss, 1981).

According to Land and McGregor, the required information for the organization management can be: descriptive in nature; probabilistic models, or values of systems and variables; explaining and assessment; unexpected, unscheduled; persuasion, propaganda type (Land, McGregor, 1981).

Wallace and Kremzar separate two types of data necessary for decision-making: less strictly accurate and strictly accurate data. In case of strictly accurate data, the margin of error can only be very small. These include for example inventory, ordered products and supplies, material invoices or route planning. The enterprise has to make huge amount of efforts and spend a lot of time to make these data more accurate. The less strictly accurate data also cannot be ignored; one has to treat those within reasonable scopes as well (Wallace, Kremzar, 2006).

The information used for decisions can originate from inside the enterprise, from its internal information system or from databases outside the enterprise. While information systems are very good at handling internal data, in most cases there is no system which can handle the diverse area of external information. Often a system of external information does not exist within the enterprises.

According to Szabó, Lehota, Badacsonyi, Szekeres and their colleagues the internal and external sources of information are:

- internal reporting systems (internal database), own surveys, own researches and analyses (these are primary information sources);
- numbers and text, speech, graphics, diagrams and video published on paper, broadcast on the radio or in television, or in the internet (secondary information sources). (Szabó, 2001) (Lehota et al., 2001) (Badacsonyi, 2003) (Szekeres, 2004)

In Bőgel's opinion everything what comes into the manager's office is information. (Bőgel et al., 2002) The manager can receive information in many different forms, thus meeting minutes, memo of the colleagues, messages of the employees, self-made memos of the managers, internal periodicals, circular letters, newspapers, books, business letters, reports, electronic messages, other publications and informal conversations etc. can all be sources.

NEEDS

Managers need information which optimally serve decision making. The quantity of information to be processed depend on factors such as the volume of products produced and sold, the number of customers, the complexity of the resource allocating decisions and the section of the work. In addition, the information needs depend on the level of performance aspiration of the enterprise as well. The need of information processing grows with the increase of uncertainty of the activity too (King, Shuker, 1987).

To find – and even sometimes phrase – the information necessary for decisions can cause problems for enterprise managers (Salles, 2006). Thus supplying executives with information is a constantly changing and persistent dilemma. Executives often have different needs and expectations towards the creation of business information. One can frequently hear them saying, "we are overwhelmed with plenty of data but there is only a

small amount of good information which can be used for management. The information I get are not the ones I would like to get... The required pieces of information are not at my disposal or they are not available." (Véry, 2002).

The statement, according to which when moving up the organization hierarchy, the executives need to see more, is not true. On the contrary, when going higher in the hierarchy, increasingly cumulated information is needed for the effective decision-making. In case of information, one should not go too far, the needed internal and external information should be carefully picked (Dobay, 2003). The main characteristics of the information needed at the different levels of the leadership are:

- At the senior management level the information should not be too detailed, it cannot be too wordy. The reports prepared for this level must contain summaries of a broader context. Weighted points have to be highlighted, thus offering decision situations and alternatives. It is not easy to prepare information of interest for this level but it can be an important orientation point for the chief executives.
- The middle management needs adequately detailed and accurate information primarily belonging to the functions they are responsible for. Time and its planning and keeping are the most important parameters at this level. The information should apply to the performance of the processes, the achieved results, the expenses and the deviation from the plans.
- At the lowest level of management, the information should be relevant to solve production problems. Detailed information is needed related to the different production areas (Anderson, 1992).

Table 1. shows the summary of different information needs for decision-making at the leadership levels (Kacsukné, Kiss, 1999).

Table 1. The decision levels and the characteristics of the required information (Source: Kacsukné, Kiss, 1999)

Information characteristics	Level of decision-making		
	Operational	Tactical	Strategic
Dependence on internal information	very high	high	moderate
Dependence on external information	low	moderate	high
Degree of information summation	very low	moderate	high
Prompt information request	very high	high	moderate
Forecasting information request	low	high	very high
Archive information request	high	moderate	low
Financial information request	low	moderate	high
Dependence on information system	high	moderate	less than moderate
„What if..." type of information request	low	high	very high

CRISIS

Sometimes one can speak of an information crisis in organisations which has the following characteristics:

- Executives are flooded with more and more quantity of information;
- The information already gathered cannot be properly distributed in the organisation;
- There is no system in the organisation which could help the executive to find the requested information;
- The received information are bad quality, that is inaccurate, late, inconsistent and in incorrect format.

It can also lead to a crisis when executives are made to believe that all kind of information can be easily and quickly acquired with modern information tools.

To avoid the information crisis, it is practical to manage the enterprise information as a resource and plan their acquisition and utilization. The information has to be purchased and can be and should be managed, just like the other resources of the enterprise: it has costs, it has to be financed (Dobay, 2003).

RESOURCE AND VALUE

Decision-makers believe that information has economic value, since they can get into better position if the decisions are based on economic variables and signs (ie. information). However, such information is often not spontaneously given, it has to be procured. Therefore, a lot of business actors are even willing to pay for the information (Arrow, 1979).

Information means costs, however the additional information reduces uncertainty, thus information has benefits too. The value of information is determined by how much it can reduce the costs which arise because the uncertainty accompanying the decisions (Enyediné, 1997).

On the one hand it is a generally accepted opinion, that the value of the information (when carefully selected and processed) is more than the cost of its acquisition, storage and processing. The problem with this statement is that it is not based on reliable calculations, it is only a manager opinion: somebody with adequate quantity, quality and form of information may gain advantage in business (Dobay, 2003). Although the value of information cannot be always quantified, it may provide a variety of economic values in the hand of the executive: greater efficiency, greater effectiveness and a higher level of compliance (Szekeres, 2004).

On the other hand there is also a radical theory of the information. According to this theory the information has no meaning and has low value. Sveiby grounds his opinion on the fact, that in the chaotic information market, a report full of data can be easily refuted in the near future by another report on the same subject but containing different data. Or: when collecting or choosing information, an expert supporting a particular viewpoint, can have significant influence on the process. Or: there can be a lot more wisdom of life in an experienced executive than in any database or book. This radical definition of the information prepares better for future happenings and saves money for the enterprises, according to Sveiby (Sveiby, 2001). In comparison most firms behave as if the information is meaningful and has a high value.

QUANTITY AND HANDLING

Due to the information explosion the available information is unusable and unmanageable for the business actors. The more information is available, the less useful it is, due to the redundant items which ultimately prove to be useless and because of the time spent with searching.

Since executives need only relevant and adequate information for their deicisions, the main goal is to make the right information available to the right user, at the right place, at the appropriate time and in sufficient quality for the right price (Kiszl, 2005).

Hanyecz sees the negative consequences of the inappropriate information supply in the following (Hanyecz, 1997):

- As a result of the too much data, decision-makers do not focus on the significant points, so critical success factors may be overlooked.

- The data can quickly lose its actuality in a rapidly changing environment and the consequence is the narrowing or losing the scope of actions.
- The inconsistent data may increase uncertainty of the decision-making.
- Data not fully accurately reflecting the situation and relations, missing or incomplete data can lead to incorrect and incomplete interpretation as well as decisions with the same characteristics.

In an information-rich world the wealth of information means the scantiness of something else, namely the scantiness of what the information consumes. Information consumes the receiver's attention (Simon, 1982/b).

An effective method to manage the information oversupply is to create and operate a modern, computer supported information system. Although, according to Simon, this statement is only valid if the computer solves the problem of the information flood. An information system can only help if it absorbs more information than it creates (Simon, 1982/a).

REFERENCES

1. Alföldi I., Staub E. (1988): Statisztikai informatika és eszközei. Statisztikai Kiadó Vállalat, Budapest.
2. Anderson, R. G. (1992): Information and Knowledge-Based Systems, Prentice-Hall.
3. Arrow, K. J. (1979): Egyensúly és döntés. Közgazdasági és Jogi Könyvkiadó. Budapest.
4. Badacsonyi A. (szerk.) (2003): Vezetésmódszertan. Szegedi Tudományegyetem Mezőgazdasági Főiskolai Kar. Hódmezővásárhely.
5. Berey A. , Dobos I. (1979): Vezetés és vezető. Közgazdasági és Jogi Könyvkiadó. Budapest.
6. Berey A., Dobos I.(1986): Vezetés a gyakorlatban. Közgazdasági és Jogi Könyvkiadó. Budapest.
7. Boros J. (1995): Információs rendszerek: az információs rendszerek alapelemei és életciklusa Magyar-Amerikai Vállalkozási Alap Nemzetközi Menedzser Központ. Budapest.
8. Bőgel Gy., F. Ható K., Keresztes J., Salamonné H. A., Zárda S. (2002): Szervezési és vezetési ismeretek: elmélet és gyakorlat informatikusoknak. Számalk Kiadó. Budapest.
9. Chikán A. (1978): Operációkutatás és döntéselmélet II. Műszaki Könyvkiadó, Budapest.
10. Chikán A. (2005): Vállalatgazdaságtan. Aula Kiadó. Budapest.
11. Cullmann, G.; Denis-Papin, M.; Kaufmann, A. (1973): A hír tudománya: az információelmélet alapjai. Gondolat Kiadó. Budapest.
12. Dinya L. (1987): Korszerű döntés-előkészítő módszerek alkalmazása a mezőgazdasági vállalatokban. Mezőgazdasági Kiadó. Budapest.
13. Dobay P. (2003): Vállalati információmenedzsment. Nemzeti Tankönyvkiadó. Budapest.
14. Dunajszki A. , Horváth Gy., Nyikos L.(1970): Információ, tervezés és döntés a vállalati gyakorlatban. Közgazdasági és Jogi Könyvkiadó. Budapest.
15. Enyedi M.-né (1997): Bevezetés a döntéselméletbe. Ligatura Kiadó. Budapest.
16. Gábor A. (1993): Számítógépes információrendszerek. Aula Kiadó. Budapest.
17. Halassy B. (1994): Az adatbázis-tervezés alapjai és titkai: avagy az út az adattól az adatbázison át az információig. IDG Magyarországi Lapkiadó. Budapest.

18. Hannon, N. J. (2005): Making Data the Center of Your Information System. Strategic Finance; Oct 2005, Vol. 87 Issue 4, pp. 55–61.
19. Hanyecz L. (1997): Controlling: a vezetés eszköze és módszere. Janus Pannonius Tudományegyetem Egyetemi Kiadó. Pécs.
20. Horváth I. (2002): Közigazgatási szervezés- és vezetéstan. Dialóg Campus Kiadó. Budapest–Pécs.
21. Jánoki L., Kocsis J. (1986): Számítógépes termelésirányítás. Műszaki Könyvkiadó. Budapest.
22. Kacsukné B. L., Kiss T. (1999): Bevezetés az üzleti informatikába. Akadémiai Kiadó. Budapest.
23. Kindler J. , Kiss R. (1981): Döntéselméleti és módszertani tanulmányok II. kézirat. Veszprém.
24. King, R. P.; Shuker, I. G. (1987): Strategic Responses to Changes in Information Technology. American Journal of Agricultural Economics; Dec87, Vol. 69 Issue 5, pp. 1056–1061.
25. Kiszl P. (2005): Az információgazdálkodás kihívásai a globális információs gazdaság korában. Vezetéstudomány. 2005. (36. évf.) 2. sz. pp. 38–46.
26. Land, F. F.; McGregor, M. (1981): Effective Use of Internal Informatio, Pergamon, England.
27. Lehota J., Horváth Á., Komáromi N., Túri Z. (2001): Marketingkutatás az agrárgazdaságban. Mezőgazda Kiadó. Budapest.
28. Lönnqvist, A.; Pirttimäki, V. (2006): The Measurement of Business Intelligence Information Systems Management; Winter2006, Vol. 23 Issue 1, pp. 32–40.
29. Salles, M. (2006): Decision making in SMEs and information requirements for competitive intelligence. Production Planning & Control; Apr2006, Vol. 17 Issue 3, pp. 229-237.
30. Simon, H. A. (1982): A vezetői döntés új tudománya. Statisztikai Kiadó. Budapest.
31. Simon, H. A. (1982): Korlátozott racionalitás. Közgazdasági és Jogi Könyvkiadó. Budapest.
32. Susánszky J. (1985): Tanulmányok a szervezésről és a vezetésről. Akadémiai Kiadó. Budapest.
33. Sveiby, K. E. (2001): Szervezetek új gazdagsága: a menedzselt tudás. KJK-KERSZÖV Jogi és Üzleti Kiadó. Budapest.
34. Szabó L. (2001): A vállalati piackutatás gyakorlata. Perfekt Kiadó. Budapest.
35. Szekeres Zs. (szerk.) (2004): Menedzsment alapismeretek. Szegedi Tudományegyetem Mezőgazdasági Főiskolai Kar. Hódmezővásárhely.
36. Tarnóczi T. (2008): Döntéstámogató rendszerek. Debreceni Egyetem. Közgazdaságtudományi Kar.
37. Varga M. I. (szerk.) (2003): Vezetői információs rendszerek – gyakorlati útmutató. Menedzsment Fórum Online. www.mfor.hu/cikkek /10391.html.
38. Véry Z. (2002): Vezetői információs-rendszerek az agrárgazdaságban. „Integrált irányítási- és információs rendszerek fejlesztése az élelmiszergazdaságban" OTKA T034627.
39. Wallace, T. F.; Kremzar, M. H. (2006): ERP – vállalatirányítási rendszerek. HVG Kiadó. Budapest.
40. Z. Karvalics L. (2004): Bevezetés az információtörténelembe. Gondolat-Infonia Kiadó. Budapest.

E-CONTENT FOR MEDICAL STUDENTS

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ABSTRACT

Blended learning, i.e. traditional methods used with modern computer and internet based technology, can enhance the effectiveness of training. We have created an e-content for the dermatology training of medical students and a testing system with Microsoft Learning Content Development System and Hot Potatoes JQuiz, both are free software. The SCORM compatible e-content covers the different types and characteristics of primary and secondary skin lesions. The content which can be used online or offline as well in a browser helps the students to deepen their knowledge with tests and playful quizzes. The html and JavaScript based testing system gives the tutors a quick and objective method to evaluate the performance of the students. We have used technologies which are supported by several authoring and learning management systems in order to be able to modify and transfer our work in other, even more sophisticated applications in the future.

INTRODUCTION

Modern technology changes our lives in every aspect. Computers and internet have become part of our lives in the last two decades. These state of the art tools play an increasing role in education as well. This does not mean that computer systems supplant traditional teaching methods, but they can make teaching and learning more efficient when properly used.

One way to use the modern technology in education is called blended learning (also called hybrid or mixed learning). According to a definition, blended learning is "facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and is based on transparent communication amongst all parties involved with a course" (Heinze, Procter, 2004). So this type of learning refers to a mix of different learning environments, like electronic learning (e-learning) or mobile learning with other traditional methods and resources. Sometimes it includes e-mentoring or e-tutoring – besides human interaction of a tutor – as well.

To utilize blended learning, a computer system – with a network connection if possible – is needed. Any computer system which provides customized instruction or feedback to students without the intervention of humans is an intelligent tutoring system (Psotka et al., 1988).

First of all one needs a material, a content which is to be used for e-learning. The e-content is defined as instruction delivered on a computer via internet or other storage device (optical disk, USB drive etc.). (Clark, Mayer, 2007) It can be self paced or instructor led. It can use different types of media – text, graphics, (streaming) audio and video –, so it contains multimedia elements.

A program (software) which allows the creation of the e-content is also necessary. An authoring system is a computer based system which allows a general group (including non-programmers) to create, to author content for tutoring systems. It provides high-level visual

tools which make it possible to manipulate text, graphics, audio and video and define interactions etc. and to design a complete system without writing any programming code. (The programming features are generally hidden behind buttons, menus or other tools. Figure 1.) In many cases a proprietary authoring language may also be included in the system to fine tune the elements of the developed e-content.

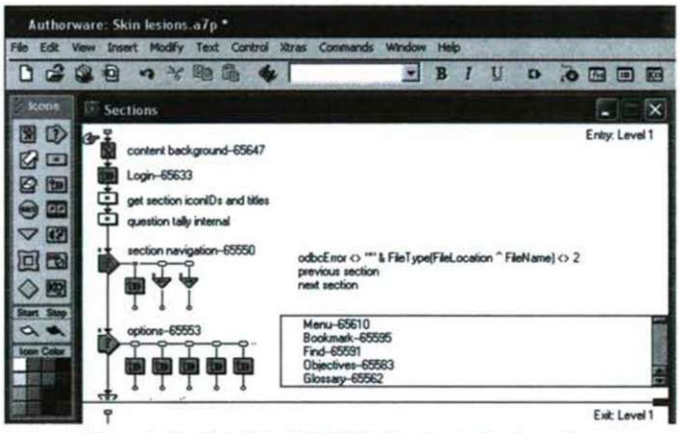

Figure 1. User interface of Adobe Authorware authoring system

The e-content can be written and stored in many different formats which can be the proprietary form of the used authoring system and besides that a widely used format, like hypertext markup language (html) or Shareable Content Object Reference Model (SCORM) etc. can also be used in most cases. The html is the standard format of web pages which can be easily edited with web editors (or any programmes which can save documents in html format) and viewed in browsers. SCORM is a collection of standards and specifications mainly for web-based e-learning. It defines how to create "sharable content objects" (SCOs) which can be reused in different systems and contexts and it also defines how the content may be packaged into a transferable compressed file (Rustici Software, 2010).

A programme is needed to use, to view the finished e-content, i.e. the e-learning material. As mentioned before, this can even be a simple web browser in most cases. For a higher level of blended learning, there are so-called learning management systems (LMS). These programmes are able to administer, document, track and report the advance of the students, and manage many curricula or classrooms over a network (Ellis, 2009).

Creating such system is resource intensive, it can be very time-consuming and costs a lot of money, but nowadays there are several ready to use tutoring systems (even freeware) which can be tailored to the developers' needs. Accordingly, the user, the content creator can focus on developing the e-content.

TEACHING DERMATOLOGY FOR FOREIGN MEDICAL STUDENTS AT THE UNIVERSITY OF PÉCS MEDICAL SCHOOL

The dermatology training of foreign medical students in English language started in 1981. Dermatology is taught in the fifth year. Each year there are about 40 students in the class. The basic lesions are the foundation of dermatology, without which it is impossible to

describe a skin symptom. Students often find it difficult to correctly identify the basic lesion. With the created electronic material we hope to assist the dermatology studies of the students i.e. to learn and practice the types and characteristics of skin lesions and then test their skills.

E-CONTENT DEVELOPMENT

The material contains the absolute necessary knowledge (the main characteristics of the lesions with images) and does not substitute the professional literature or the lectures, but helps the students to drill knowledge. The authoring system we used for development was the Microsoft Learning Content Development System (LCDS), a free tool to create high quality, interactive online courses. (Figure 2.) Microsoft LCDS is able to save the created contents in many formats, including SCORM, thus our material can later be exported and modified in any SCORM compatible authoring system. (Microsoft, 2010)
We have compiled our work into a single SCO Package. This format can be used in any Microsoft Internet Explorer compatible browser with Microsoft Silverlight plug-in.

Figure 2. User interface of Microsoft Learning Content Development System

We have also created a test in another system. The test was created for the tutors to help them to evaluate the students during exams. Since we needed a free authoring system which focuses mainly on test creation, we have chosen Hot Potatoes. This application package includes six programmes to create interactive multiple-choice, short-answer, jumbled-sentence, crossword, matching/ordering and gap-fill exercises. The compiled e-content is an html file and can be viewed in any JavaScript enabled browser. (Half-Baked Software, 2009)

We used a high-performance personal computer (Intel® Core™ i7-920 2.67 GHz, 12 GB RAM, Microsoft Windows 7 Ultimate 64 bit) for the development. The finished product runs on an average PC which has adequate resources to run Windows XP, Windows Vista or Windows 7.

E-CONTENT FOR THE STUDENTS

The content for the students include the following:

- Introduction. The purpose of the e-content: Why was it created? What will the user achieve if he or she learns the material? What type of knowledge or competency will he or she get? Knowledge requirements: What former knowledge or competency is required to study the content efficiently? Hardware and software: This part informs the user about the minimum hardware and software requirements to use the material. Legal notices: Who are the creators and the editors of this work? Who is the owner and what are the terms of using the material?
- Concepts associated with lesions: What is a lesion? What can cause tissue damages? How many types of lesions are there and how many ways can they be classified?
- Primary lesions: What are the main characteristics of the primary lesions? What types of primary lesions are there and what are the characteristics of each of them: macule, papule, plaque, tuber, nodule, tumour, wheal, vesicle, bulla and pustule. Besides the text guide, each lesion is demonstrated with sample images.
- Secondary lesions: What are the main characteristics of the secondary lesions? What types of secondary lesions are there and what are their characteristics: scale (squama), erosion, excoriation, fissure, rhagas, crust, ulcer, scar (cicatrix), atrophy and lichenification. The secondary lesions are also demonstrated with sample images.
- Self tests: The purpose of this section is to playfully check the students' knowledge. Drag and drop test: The goal is to sort the types of lesions as quickly as possible into their associated categories. Tile game: The student has to click the tiles in a row and column until all tiles display primary lesions or secondary lesions. If a row or column is correct, the tiles disappear showing a part of an image in the background. True or false test (Figure 3.): twenty statements are presented based on the previous sections of the e-content and the learner has to decide whether they are true or false. Multiple choice test: The characteristics of the lesions are displayed and the student has to choose the correct lesion from a list containing five possible answers. Essay question: The student has to type in all primary and secondary lesions. While the other tests are checked automatically by the computer, this one has to be checked by student after completing it.

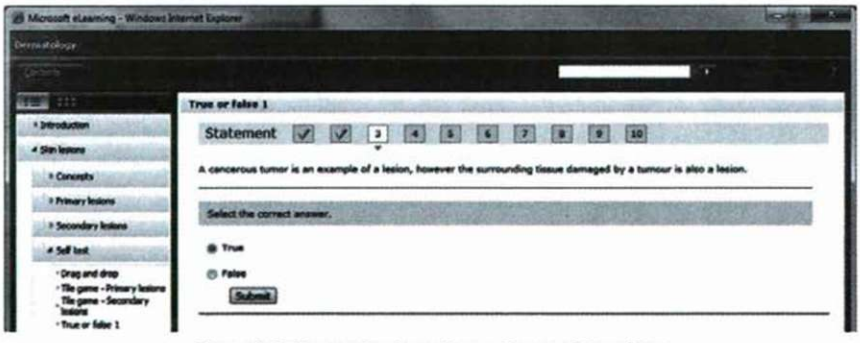

Figure 3. E-Content for the students – True or false self test

THE TESTS

We used the JQuiz programme of Hot Potatoes to create the test to check the knowledge of the students. (Figure 4.) We made two kinds of tests:

- True or false test with and without time limit: The student has to decide whether twenty statements are true or false. The statements appear randomly every time the test is started. The statements can be viewed one by one after each other or all at once. The answers are evaluated by the computer and the students get their results at the end of the test: the percent of the correct answers. When run in time limit mode, the students have five minutes to complete the test.

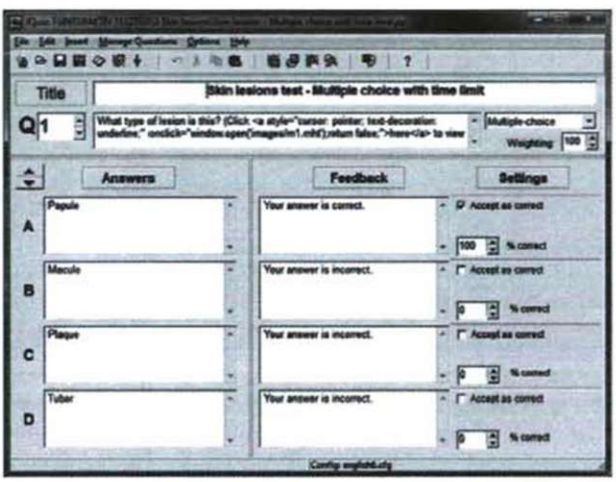

Figure 4. Multiple choice test editing in Hot Potatoes JQuiz

- Multiple choice test with and without time limit: The computer presents nineteen statements with the the main characteristics and the sample images of each primary and secondary lesions. The students have to select the right answer – the correct lesion – among five possible answers in each case. Both the statements and the answers appear randomly each time the test is run. In case of a wrong response the student has to choose another answer until he or she clicks the correct one. The evaluation is done by the computer, it presents the percent of the correct answers at the end of the test. If the test is run in time limit mode, the students have five minutes to finish it. (Figure 5.)

FINAL THOUGHTS

We have created this e-content on the one hand to help medical students to deepen their knowledge in a basic, but important area of dermatology. The students can study the material on an average performance computer wherever they want at any time and check their knowledge in a playful way. They can spend as much time as they need to practice, since the computer will never get tired or nervous. We hope this way of learning will help the students to acquire the knowledge of this area extensively.

On the other hand we have also created a material for the tutors which makes it easier and quicker for them to check how their students master the area of skin lesions. It removes the burden of correcting papers and provides the possibility of objective evaluation. Since the e-content is SCORM compatible, it can be easily transferred and integrated into other, more sophisticated SCORM and Learning Management Systems.

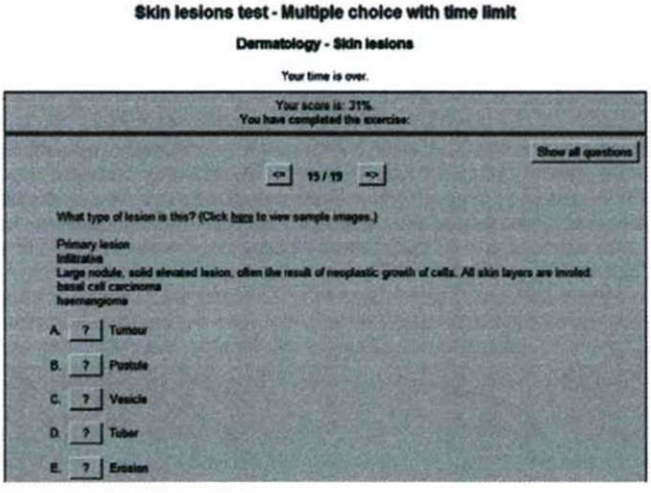

Figure 5. Multiple choice test in a web browser.

REFERENCES

1. Clark, R. C.; Mayer, R. E. (2007): E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning. Pfeifer. San Francisco.
2. Ellis, R. K. (2009): A Field Guide to Learning Management Systems. American Society for Training & Development. [online] Available: http://www.astd.org/NR/rdonlyres/12ECDB99-3B91-403E-9B15-7E597444645D/ 23395/LMS_fieldguide_20091.pdf [Accessed: 15th May, 2010].
3. Half-Baked Software (2009): Hot Potatoes Home Page. [online] Available: http://hotpot.uvic.ca /index.php [Accessed: 15th May, 2010].
4. Heinze, A.; Procter, Ch. (2004): Reflections On The Use Of Blended Learning. Education in a Changing Environment Conference. 13th–14th September, 2004. University of Salford. [online] Available: www.ece.salford.ac.uk/proceedings/papers/ah_04.rtf [Accessed: 15th May, 2010].
5. Microsoft (2010): Learning Content Development System (LCDS) [online] Available: http://www.microsoft.com/learning/en/us/training/lcds.aspx [Accessed: 15th May, 2010].
6. Psotka, J; Massey, L. D.; Mutter, Sh. A.; Brown, J. S. (1988): Intelligent tutoring systems: lessons learned. Hilsdale, NJ: L. Erlbau, Associates.
7. Rustici Software (2010): SCORM Explained. [online] http://www.scorm.com/scorm-explained [Accessed: 15th May, 2010].

IN THE SOUTH PLAIN REGION THE LACK OF HARMONY HAS A NEGATIVE IMPACT ON ECONOMIC EFFICIENCY

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ABSTRACT

Our life and business are changing day by day. Lack of the permanent harmony between the different spheres of economy, or more exactly, of agribusiness has a negative impact on economic efficiency; it hinders increase in the economy. In the present state of our development, we have to create this harmony to avoid conflicts. If we delay doing so, we will impede development of our agribusiness. We try to point at some interesting details and coherences.

1. INTRODUCTION

„Don't be afraid of moving slow but of stopping." (Chinese phrase)

The region has a typical lowland landscape which determines the aspect of agriculture, too. Food production has had an important role since ancient times. In the agricultural production the lack of cooperation often hinders the efficiency of production itself. Our joining to the EU demands harmony, development in quality. Useful tools for the economy of the region can be cooperation, collaboration, forming of partnership and increase of the inner integration.

To make our region become the south-east gate of the EU in the middle run, there should be much larger openness and competitiveness of higher level. It has to have a regenerated economy both in sectorial and inner structures (Boros, 2003).

2. MATERIALS AND METHODS

We present an essay about nowadays situation. It looks a picture, but background of it is very complicated. It is impossible to find each solution and define easy conclusions. We collected some important articles from different dailies and join them.

3. LACK OF HARMONY HAS A NEGATIVE IMPACT ON ECONOMIC EFFICIENCY

The South Plain is still strong in the agrarian sector, though we do not have a real reason to be satisfied.

In the 90s the majority of the big estates, which existed before the political transformation, became decomposed and after compensation the property was extremely subdivided in the Hungarian agriculture. 7/10 of the individual holdings, even in 2007, farmed on soils smaller than 1 ha, only on the 4% of the total area. These small lands were unsuitable to fulfil the market demands, though the old-new big estates had similar problems, too (Kovács, 2005).

Conditions of soil in the region of Hódmezővásárhely are excellent, in spite of this fact the number of farmers has decreased in the last few years.

It would have a positive effect on the local employment if sectors which demand much living labour became conspicuous, in addition to the large-scale cultivation which needs relatively little labour force.

„Special items of food" have not spread in consumption. They mean a special quality which can originate from traditions, from geographical features in connection with production of these items of food, or from the organic-like production.

The mentioned items of food seem to be very different but they have some characteristics in common which connect them, so they can be classified into an integrated system. Their general feature is that they are produced in small quantities, their production demands a high level of living labour force which then appears in their price, as well, thus they have a much higher price, compared to the items of mass-production. Their other feature is that they are suitable to fill up the slots in the market due to their short run, so the farmer does not depend on demands of the size-economy (Panyor, 2008).

In Hódmezővásárhely, according to the statistics, the number of primary producers is still high, which reaches 3.500, though this number includes both pensioners who complement their living by selling vegetables or fruit from their garden, and farmers who work for the market as professionals. Small estates which give the significant part of the approximately 2.000 agricultural enterprises had 3,2 thousand million of return from sales, while the hardly more than 10 big estates collected ten times more in 2007. 1.096 enterprises applied for support of land found in the examined year, which number is under expectations, though the quality of the soil in the region of Hódmezővásárhely, which reaches a high, 25-30 gold crown value, predicts that agriculture will play an important role in the region in the future, too (Hódmezővásárhely Társasági Magazin, 2009).

The South Plain Region has a continental climate. Alternation of longer, drier and wetter periods makes agriculture more and more unforeseeable, the extreme raining regularly test the water conservancy sector. In the driest years there were 290-320 mm of rain in certain areas, while the maximum rain was of 850-900 mm every year.

Figure 1. Picture of water covered fields in Békéssámson, Hungary
www.origo.hu/i/0903/20090309belviz1.jpg

Because of the early warm period they started to water the lands as early as April, in 2009. The proportion of irrigable lands is outstanding even in the country's level. Between Makó and Hódmezővásárhely, in the area of 132.000 ha, the third of the county is irrigated. Here, 11.000 ha is irrigable out of which about 5.500 ha is utilized by the farmers (Szabó I. Délvilág, 2009). Those who had the opportunity could benefit from it, but the insurance of the crops would really be worth for them if the cheap import did not arrive to the country.

The other condition of this landscape is the danger of inland waters. In 2010 20.000 ha was covered by inland waters in Csongrád county. In our region there have been twice as much rain as usual since January, and inland waters destroy 8.000 ha of crop lands (Dobkó, 2010).

Inhabitants of the region can say that water is both curse and blessing here. In the first case protection is very expensive and reduction of crops is significant, too. On more than 60% of the arable lands in the South Plain cereals are grown out of which the most important one is autumn wheat (about 291.000 ha) then corn and sunflower. The South Plain gives around 40% of vegetables. 77% of garlic, 50% of pepper and bonnet pepper, 43% of parsley, 39% of onion and 38% of sweet corn production come from here.

80% of the country's ground paprika is grown and produced in the regions of Kalocsa and Szeged. Due to the favourable natural conditions and diligence of local people numerous products, with their special flavour, content value and special processing, raise the reputation of the region as hungaricums. The most outstanding ones are the ground paprika, apricot, peach, onion, garlic and honey which are famous all over the world. Farmers like sour cherry and plum too. In Békés watermelon is preferred.

3/10 of the pig population of the country, ¼ of the sheep population, 1/5 of the cattle and hen population are raised in this region.

The region is characterized by the prevalence of food industry based on procession of agrarian products. Quick changes Europe-wide have impacts on us. There are many uncertainties we have to face with. With low level of income, it is very difficult to compete with the strongly supported Western markets which have lasting traditions.

After the political transformation agriculture has not really found its position in the economy. The Hungarian small holders have to realise that they cannot survive individually but only in the form of co-operation. For example, corn-farmers should cooperate in 2-3 places with the aim of selling. The same thing is true for vegetable and fruit- farmers, for example in Homokhát, or for hog raisers, too. The EU regulation favours them. There is nothing to do with the complaints of separated farmers. It should be realised that huge mergers of the world buy or sell products. It is not favourable either that even the country's consumption is decreasing, with the exception of poultry, the product is given, prices of the world market are lessening and are stabilised in a low level. However, agriculture should live not on financial supports but on production, on prices. Nowadays farmers cannot afford investments.

The most important change in the European Union is the incredible increase of competition which can be realised in the quick acceleration of concentration, modernisation and in the spread of integration. Only bigger estates can survive and develop, while the Hungarian private small holders get false messages. 96% of the holdings regarded as private ones cannot reach even the lowest level. Even today there is no effort to form optimal plot-sizes, what is more this expression has not spread in Hungary so far.

Remaining standing was heavy for the food industry firms following the political transformation and to be a match for the competitors. There were companies that got ruined duly for this e.g. Sugar Plant in Mezőhegyes (Zsótér, 2010).

Earlier connections between farmers and firms of food industry, after the political transformation, transformed or became less tight, and in certain places they came to an end. They had to adapt themselves to a new market and economic situation. Today it would be much easier if producers of basic materials and processing firms had had more tighter connections. They did not utilize the possibilities of co-operation, so by today agricultural production and food industrial utilization have been separated, in many cases they work without accord. Others problems are the slow, bureaucratic attitude of the state measures, ignorance on behalf of entrepreneurs and lack of qualification.

The food industry processes special raw materials which spoil quickly and which suffer damage in quality very quickly. High degree of productivity and damage in quality both demand the permanent production but for it, it is necessary to ensure both supply of basic materials and reliable services. It is necessary to make persons, goods and services avail-

able in good time, at the given place, in good quality and possibly for a lower price. That is why it is so important in each level of food production that not only the logistical services, but all infrastructural sectors, and their system should be developed (Komarek, 2010). In the future the role of logistics and that of the agrarian logistics, together with controlling will increase. It seems that it becomes one of the most important factors of success.

A Hungary should be aimed that tries to create a more harmonic future for the agrarian sector, after the disharmonic past.

4. CONCLUSION

Lack of the permanent harmony between the different spheres of economy, or more exactly, of agribusiness has a negative impact on economic efficiency; it hinders increase in the economy. In the present state of our development, we have to create this harmony to avoid conflicts. If we delay doing so, we will impede development of our agribusiness.

In the South Plain education and training of experts, professional have a long-lasting tradition, it is of high level and it is ensured in all levels. Training institutions try to adapt themselves to the needs flexibly. The offer in training is large, though the interest shown towards it is hardly suitable. Possibilities are still not taken into consideration in the agrarian sector. It seems that eco-economy, bio-, material-, and environment engineer, and manager trainings should be enlivened. With almost a decade after our joining to the European Union there are still people who are ignorant and misinformed, in most cases farmers are responsible for this situation. It is not general in Hungary that entrepreneurs have any qualifications in agriculture. It is ignored that machine park worth of some millions of forints should not be entrusted to those without training or qualification.

REFERENCES

1. Boros János (2003): A Dél-Alföldi Régió mezőgazdasági és környezetvédelmi helyzete az EU-hoz való csatlakozás előtt, Agrárgazdaság Vidékfejlesztés és Agrárinformatika az évezred küszöbén, AVA 2003. április 1–2.
2. Kovács András (2005): Magyarország kukorica nagyhatalom, 2005. 02. 16. delmagyar.hu, www.delmagyarorszag.hu
3. Panyor Á. (2008): A különleges minőségű élelmiszerek vidékfejlesztésben betöltött szerepe, Jelenkori társadalmi, gazdasági folyamatok, ÖVI 2008 évi tudományos évkönyve, III. évf. 1. szám 25. p.
4. Mezőgazdasági körkép (2009): csökken a gazdaságok száma 2009, Mezőgazdasági Társasági Magazin, 2009.05.15. II. p. Szuperpress.
5. Szabó I. (2009): Május helyett már most elkezdték az öntözést, Dobó Dolli Makó határában már öntöznek a földeken, Délvilág, 65. évf. 2009. 04. 15. p. 1.
6. Dobó Anna (2010): 20 ezer hektár belvíz alatt, fotó Ősszel felszántották, tél végén vízben áll az algyői határ, Délvilág, 66. évf. 2010. 02. 24. p. 1 és 5.
7. EU cipp (2009): www.apr.hu 2009. 03. 04.
8. Komarek L. (2010): Gondolatok a dél-alföldi élelmiszeripar infrastrukturális ellátottságának kérdéseiről, kézirat
9. Belvíz www.origo.hu/i/0903/20090309belviz1.jpg – 2010. 05. 25.
10. Zsótér B. (2010): Egy feldolgozóüzem megszűnésének hatása a napi ingázásra. Agrár- és Vidékfejlesztési Szemle, SZTE MGK, Hódmezővásárhely, 2010. vol. 5. (1) 259–261. (CD melléklet)

CORPORATE GOVERNANCE OF THE BKV – WHO IS RESPONSIBLE FOR THE SCANDALS?

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ABSTRACT

Corporate governance is an internal system encompassing policies, processes and people, which serves the needs of shareholders and other stakeholders, by directing and controlling management activities with good business savvy, objectivity, accountability and integrity. In the case of government-owned companies orderly operation and management is crucial, since they are spending the property of the tax-payers. In the greatest corporate scandal in Hungary, that of the BKV millions of Euros were wasted on fictious services. The case has several considerations on corporate governance regulation and practice in Hungary. In my paper, as a case study, I present the corporate governance system of the BKV and analyze the responsibilities concerning the BKV scandals from an organizational point of view.

1. INTRODUCTION: BKV AND THE BKV SCANDAL

BKV is a closed company limited by shares, with the Metropolitan Government as its founder and owner (shareholder). It is in charge of public transport of the capital and its surroundings, operating five large sections of public transport (bus, tram, subway, suburban railway line, trolleybus) in an integrated system. The fleet of BKV vehicles accomplish nearly 1.4 billion passenger rides annually. The capital of BKV amounts to HUF 127 billion, registered in shares. The company faces financial difficulties, its revenues do not provide sufficient coverage for its expenditures. In 2008, the balance sheet loss of BKV amounted to HUF 5.7 billion, its operation could only be maintained through taking up a credit (HUF 4.5 billion in total) and utilizing considerable state subsidy (HUF 70.5 billion). In December 2008, the company received a single-sum reimbursement from the state, which amounted to HUF 10 billion. The price supplement granted was over HUF 17 billion (source: BKV Annual Report for 2008). At present, BKV has a total external debt of 90 billion forints, with the company's estimated internal debt amounting to HUF 350–700 billion (source: Report of the Commission of Inquiry of the Metropolitan General Assembly).

Starting from 2007, a number of scandals related to BKV have occurred. They may be assigned to two groups: those concerning the salaries and severance pay of top employees, and those associated with consultation and other contracts. Several people are now under arrest charged with embezzlement because they had concluded contractors' and service agreements on behalf of BKV, despite its loss-making operation, for the provision of unjustified and unnecessary services, or endorsed performance thereof, thereby causing the transport company damage to property amounting to more than HUF 100 million. Also several people have been arrested because of the salaries and severance payments. Extra payments were made on 48 occasions and the company suffered a damage amounting to around half a billion HUF.

2. CASE STUDY

2.1. Corporate governance of BKV

The owner

In accordance with Act no. IV of 2006 on Business Associations, the supreme body of a company limited by shares is the general meeting. However, no general meeting functions in the event of a single-member company limited by shares, and the sole member is entitled to decide, through written resolutions, on all issues falling within the competence specified in the deed of foundation of the company (source: Act on Business Associations) In case of BKV, the body exercising the founding members' rights of a single-member closed company limited by shares is the general assembly of the capital city (the "city assembly"), or a committee thereof. The related details of operation of the founding member are determined in the rules of organization and operation of the Metropolitan Government (the "Metropolitan Government Rules").

Since the change of the political regime in 1990, a liberal-social majority has operated the Metropolitan Government, with Gábor Demszky being the mayor (Free Liberal Party). The recent 66-member board of representatives which was formed after the local government elections in 2006, consists of 24 Socialist, 26 Young Democrat, 4 Christian Democrat, 9 Free Liberal, and 3 Hungarian Democratic Forum members (Source: the Metropolitan Government).

The city assembly as the body exercising the rights and fulfilling the obligations of the single-member BKV closed company has transferred the above owner's competence of the Metropolitan Government to the Economic Committee of the city assembly in the Rules (source: the Metropolitan Government Rules).

In pursuance of the Act on Business Associations, several rights, among them certain rights relevant for the present research, fall within the exclusive competence of the supreme body of the company:

- establishment and modification of the statutes;
- election, withdrawal, and specification of remuneration of the members of the board of directors, the chief executive officer, the members of the supervisory board, and the auditors;
- adoption of the annual report;
- decision on all issues that fall within the exclusive competence of the general meeting in pursuance of the statutes or the law.

(Source: Act on Business Associations)

Compared to that set forth in legal regulations, the Deed of Foundation of BKV extends the scope of issues falling within the exclusive competence of the founder with the following founder's rights that are relevant for the present research:

- approval of the annual business plans of the company,
- approval of the rules of operation of the board of directors and the rules of functioning of the supervisory board ("SB").
- elaboration of the rules regulating the system of remuneration of senior officers and top managers of the company (wages, severance pay, other personal payments).

The founder reviews and evaluates the following documents and/or activities pertaining to the present research, and makes the relevant decisions:

- report of the board of directors on the management of the company during the previous year, its assets and business policy,
- report of the SB on the review of the annual report and the proposal regarding the utilization of profits,

- auditor's report,
- remuneration of the board of directors, the SB, the auditor, and the chief executive officer.

(Source: Deed of Foundation of BKV in the version valid as of April 11, 2010)

Professional monitoring

From December 21, 2006, the supervision of public utility companies, business associations performing public utility activities, and also trust administrator companies owned by the capital city, including BKV, were the task of one person, the vice-mayor in charge of city operation and trust administration, Mr. Miklós Hagyó (socialist). Starting from March 06, 2007, these tasks were carried out in conjunction with Mr. Imre Ikvai-Szabó (free liberal), vice-mayor in charge of city development, management, and social policy, in such a way that the activities of the above companies solely related to economic management were relegated to Mr. Imre Ikvai-Szabó.

On September 03, 2009, Mr. Miklós Hagyó left his office as the officer in charge of supervision of BKV., and the related roles went over to Mr. Csaba Horváth (socialist), vice-mayor in charge of Culture and Education. As the socialist-free liberal coalition broke up on December 22, 2009, Mr. Imre Ikvai-Szabó remained the only functioning vice-mayor, so he took over Csaba Horváth's tasks connected to BKV (see Note 1) (source: Report of the city assembly Commission of Inquiry)

Internal management

BKV has a two-tier internal management system, that is, the company operates a board of directors (executive board) and a supervisory board.

The board of directors

The management of a closed company limited by shares may be carried out either by a single person, that is, the chief executive officer, or the board of directors as a body. The law also provides an opportunity for senior officers to grant the right of representation in various matters to certain groups of employees. Pursuant to the Act on Business Associations, the executive officer of the company exercises the employer's rights vis-à-vis the employees of the company. The law also allows exercising the employer's rights to be delegated to some employee at a lower level of the working organization.

As the law provides, the executive officer is required to conduct the management of the business association with the increased care generally expected from persons occupying such positions, give priority to the interests of the business association, and report to the shareholders in the course of fulfilling his duties. The board of directors is required to prepare a report on the management, the financial situation and the business policy of the company at the regular intervals set forth in the deed of foundation (statutes), but at least once every year for the general meeting, and at least once every three months for the supervisory board.

According to the ruling of the Act on Business Associations, the board of directors shall consist of at least three and at most eleven members. Act no. CXXII of 2009 on the More Economical Operation of Publicly Owned Business Associations specifies the number of members of the board of directors of closed companies limited by shares as an exception to the ruling contained in the Act on Business Associations. It defines the number of members of the board of directors to be minimum three and maximum five. If the business association concerned qualifies as a company of special importance for the national economy, the maximum number of the members of the board of directors is limited to seven. The particular number of members of the board of directors is fixed, within the confines

permitted by law, in the Deed of Foundation of the given company (source: Act on Business Associations and Act no. CXXII of 2009).

The Deed of Foundation of BKV Zrt. regulates the operation of the board of directors as follows:

The board of directors is the management body of the company which acts as an independent body exercising its scope of rights in the course of meetings of the board of directors. The board of directors consists of 5 to 7 members appointed by the founder. The board of directors performs the following duties relevant for the present research:

- establishment of the business organization of the company
- passing decisions related to the financial management of the company
- preparation of business plans and annual reports for the founder
- preparation of written reports for the founder on the management and operation of the company on a semi-annual basis
- preparation of quarterly reports for the SB on the management and operation of the company
- establishment of the Rules of the company
- exercising the rights associated with the legal relationship of the chief executive officer (except those granted to the founder)
- taking necessary measures that may be required pursuant to assumptions formulated by bodies involved in the external or internal control of the company.

As the task at hand is a public duty and the founder is responsible for the public services, and because the owner's participation is vested exclusively in the local government of the capital city, the executive officer is obliged to proceed in accordance with the instructions of the person acting on behalf of the founder. The founder is entitled to withdraw or limit the executive officer's competence (source: Deed of Foundation of BKV in the version valid as of April 11, 2010).

The Supervisory Board

The basic duty of the SB is to monitor the management of the company in the founders' interests, and is liable for its activity towards the shareholders. In accordance with the provisions of the Act on Business Associations regarding the number of the members of the supervisory board, the supervisory board may consist of at least three and at most fifteen members. Act no. CXXII of 2009 on the More Economical Operation of Publicly Owned Business Associations has reduced the number of members of the supervisory board of publicly owned companies as well: in case the registered capital of the company exceeds two hundred million HUF, that number may vary between three and six members. The order of operation of the supervisory board is approved by the supreme body of the company.

The Act on Business Associations regulates the operation of supervisory boards as follows. The board of directors is required to inform the supervisory board on the management and the financial situation of the company at least once every three months. The supervisory board may directly inform the owners, by way of a meeting of the supreme body of the company, about irregularities and deficiencies established from the reports or revealed in the course of supervision. While performing his supervisory function, a member of the supervisory board is entitled to request information from the executive officers or the managerial employees of the company. Members of the supervisory board may inspect the books and documents of the company, review and investigate them. As a most important security and a major regulation for the protection of public interest, the supreme body of the company may pass a resolution regarding the adoption of the annual report prepared

by the board of directors in compliance with the provisions of the act on accounting only in possession of the written report of the supervisory board. If, in the judgment of the supervisory board, the activity of the executive officers is contrary to the law, the deed of foundation or the resolutions of the general meeting, or otherwise infringes on the interests of the company or its members, the supervisory board has the right to call an extraordinary meeting of the supreme body (general meeting) and simultaneously propose its agenda (source: Act on Business Associations).

As regards BKV, there are several legal provisions which make the establishment of the SB mandatory. The SB consists of 3 to 6 members. Two-thirds of the members are appointed by the founder, and one-third is elected by the plant council from among the employees.

The Deed of Foundation of BKV regulates the operation of the SB in the areas relevant for the present research in the following way. The SB is required to supervise the management of the company and its business policy decisions for the founder on a regular basis. The founder may pass a valid resolution on the annual report and the appropriation of after-tax profits only in possession of the findings of the supervision of the SB. The auditor is obligated to inform the founder and the SB if he learns about a fact that appears to confirm the responsibility of the executive officer or the members of the SB. The supervisory board is entitled to request a report or information from the executive officers or the managerial employees of the company. The requested report or information shall be provided to the SB within a period of fifteen days. The SB has the right to inspect the books, documents, and petty cash of the company at any time, if necessary, through the inclusion of experts. Members of the SB are obliged to perform their duties with the care generally expected from persons occupying such positions. They are liable to the company in accordance with the rules of civil law for damages caused to such by violation of their duties (source: Deed of Foundation of BKV in the version valid as of April 11, 2010).

The management

The management of BKV. is in charge of the daily operation of the company. In accordance with the rules of organization and operation, the management is comprised of the following offices:

- the chief executive officer,
- the deputy chief executive officers.

(Source: Report of the city assembly Commission of Inquiry)

The chief executive officer is a member of the board of directors. As the manager in charge of the business organization, he exercises the employer's rights, which he may transfer to other managers of the business organization (source: Deed of Foundation of BKV in the version valid as of April 11, 2010).

The chief executive officer of the company — both as a member of the board of directors and as the person entitled to use the chief executive officer's title — is appointed and commissioned exclusively by the founder, who is also exclusively entitled to decide on his withdrawal and the establishment of his remuneration. All other rights in respect of the legal relationship of the chief executive officer are exercised by the board of directors as an independent body.

The scope of competence of the chief executive officer as a senior officer is specified in the Rules. In accordance with the relevant provisions, the chief executive officer is empowered to establish the detailed rules of organization and operation of the business organization within the confines of the Rules. The Rules sets out the major authorizations of the chief executive officer, viz., the right to make decisions and measures individually in

any matters not falling within the exclusive competence of the owner or the executive body of the company, and also to assign any decisions and measures in the business organization to his own sphere of competence (source: Report of the city assembly Commission of Inquiry).

The following persons were chief executive officers of BKV in the period of this research:

Botond Aba, from July 01, 1993 to December 31, 2006; Attila Antal, from January 01, 2007 to April 15, 2008; Zsolt Balogh (appointed chief executive officer), from February 19, 2008 to December 31, 2008; Dr. István Kocsis, from September 01, 2008 on (source: Deed of Foundation of BKV in the version valid as of April 11, 2010).

The tasks and competence of the deputy chief executive officers are regulated in the Rules. In the period under review, the following positions of deputy chief executive officer existed at BKV (which changed frequently, on a total of 4 occasions during the three-year period): deputy chief executive officer in charge of transport, deputy chief executive officer in charge of financial management, deputy chief executive officer in charge of investment and public procurement, deputy chief executive officer in charge of DBR Subway, deputy chief executive officer in charge of technical issues, deputy chief executive officer in charge of sales and communication, general and technical deputy chief executive officer (source: Report of the city assembly Commission of Inquiry)

The auditor

The auditor is appointed by the founder for a period of 4 years. The board of directors proposes the person to be appointed as the auditor, upon the approval of the supervisory board. The auditor reviews all annual reports and any other reports submitted to the founder, for their compliance with reality and legality. The auditor may inquire about the management of the company. The auditor is obliged to inform both the founder and the SB if he learns about a fact that appears to confirm the responsibility of an executive officer or the members of the SB regarding an issue. In the period under review, the auditor of BKV was the Deloitte Ltd. (source: Deed of Foundation of BKV in the version valid as of April 11, 2010).

2.2. Authorities and responsibilities in the BKV scandals

Corporate governance is an internal system encompassing policies, processes and people, which serve the needs of shareholders and other stakeholders, by directing and controlling management activities with good business savvy, objectivity, accountability and integrity. Sound corporate governance is reliant on external marketplace commitment and legislation, plus a healthy board culture which safeguards policies and processes. (O'Donovan, 2003) Corporate governance ensures that boards are able to exercise appropriate scrutiny over management and that shareholders, as owners of the company, are able to hold boards accountable. (Angyal 2001) As such, a high level of corporate governance contributes significantly to investors' confidence and market stability, thus fostering business efficiency. (Frydman-Rapaczynski 1994)

Appropriate financial management is of special importance in case of companies financed by public money, since such firms spend Hungarian taxpayers' money. Accordingly, it is crucial for such companies that the activity of their management is appropriately controlled both internally and externally, in the direct interest of the owner municipality and also the taxpayers financing them indirectly.

In theory, the Act on Business Associations provides for the control over the operation of the companies by clearly identifying the responsibilities and scopes of action of the management, the supervisory board, and the owner. The system, however, failed to function appropriately in practice in the case of BKV. On the one hand, the bodies that are in charge of controlling the management of the company failed to detect and/or prevent wasting taxpayers' moneys both inside and outside the company. On the other hand, one cannot exclude the possibility that the owner's representative abused of the owner's rights and interfered with the company's internal operation with the purpose to acquire moneys for himself, rather than safeguard public moneys.

The SB claims they had no information about the agreements that were disadvantageous for BKV, and the law does not provide the supervisory board with sufficient room for manoeuvring. In line with the ruling of the Act on Business Associations, the board of directors is required to prepare a report on the management, the financial situation and the business policy of the company for the supervisory board at least once every three months. Each member of the supervisory board is entitled to request information from the executive officers or the managerial employees of the company. Members of the supervisory board may inspect the books and documents of the company, review and investigate them. If the supervisory board finds that some activity is contrary to the law or there is some deficiency in the operation of the company, it may notify the owners accordingly. All these opportunities granted in the Act on Business Associations would have enabled the SB to supervise the operation of the company more strictly, detect the abuse, and notify the owner. The case at hand does not represent an anomaly of the relevant regulations, rather, it is a case where the SB failed to use the authorization granted to it and did not meet its obligation set forth in the Deed of Foundation of BKV: „to supervise, on a regular basis, the management of the company and its business policy decisions", and „members of the SB shall conduct their duties with the care generally expected from persons occupying such positions."

The owner also referred to its lack of awareness of the things going on at BKV. According to the ruling of the Act on Business Associations, specification of remuneration of the members of the board of directors and the chief executive officer fall within the exclusive competence of the supreme body of the company, thus it is difficult to see why city assembly did not know about the severance paid to the chief executive officers. Pursuant to the Deed of Foundation of BKV, approval of the annual business plan of the company, review and adoption or rejection of the report of the board of directors on management and business policy, as well as adoption of the report of the supervisory board and the auditors also fall within the exclusive competence of the supreme body of the company. In addition, decisions regarding issues which the statutes refer to the exclusive competence of the general assembly also fall within the exclusive competence of the supreme body of the company. Consequently, the city assembly may have reserved the right of decision in any of the issues raised. That would have enabled the owner to impose more stringent control over the operation of the company and, thus, identify cases of abuse and put an end to them. In other words, here, too, the case has nothing to do with any anomaly of the relevant regulations, rather, it is a case where the owner failed to use the authorization granted to it.

As far as the other aspect of the issue at hand, that is, the owner's interference with the operation of BKV for its own purposes is concerned, the underlying regulation appears to raise problems. As the Deed of Foundation of BKV rules, the owner is responsible for the provision of public services, and, since only the local government has an owner's participation, the executive officer is obligated to proceed in accordance with the instructions of the person representing the founder. This ruling formulated in a general manner in practice allows the owner to manually control the day-to-day operation and administration of the company, thereby releasing the company management all of its responsibility.

3. CONCLUSIONS AND PROPOSALS

It follows from the above considerations that the inappropriate functioning of the SB is related to the poor performance of its members, rather than to a deficiency in legal regulations. Consequently, the present practice of delegating party representatives as members to the supervisory boards of publicly owned companies deserves reconsideration. As a more appropriate solution, members in such bodies should be dedicated and qualified experts who are, at least formally, independent of the parties, and capable of, and dedicated to, exercising the necessary control over the management of the companies.

It also follows from the above that it was due to distorted application of the law, rather than to some deficiency in legal regulations, that the owner's control turned into representation of self-interest instead of protection of the public interest. It appears that the practice whereby supervision of companies owned by local governments is performed by a person – the vice-mayor – whose education and professional experience surely do not qualify him for this position. Furthermore, as such positions are occupied by party representatives, they may very likely represent the interests of politics or the party concerned, instead of those of the public.

Another source of problem may be associated with the fact that the composition of the general assembly and the related power relations, including the mayor's and his deputies' person, would change every four years in line with local government elections or, in case of coalition rearrangement, even more frequently. This may give rise to instability of the operation of the companies they supervise. Much like in the case of state-owned companies where maintenance of their operation is not the duty of the Parliament and its officers and committees, but rather the task of the ministries, maintenance of operation of the companies owned by local governments could be relegated to the competent departments of the mayor's office. Expansion of the authorization of the National Audit Office to include companies owned by local governments may also be an idea worth considering. It would appear appropriate to keep the parties and the politics as far away from the companies as possible.

The deed of foundation of BKV and similar regulations should be modified in such a way that executive officers would be required to proceed in accordance with the instructions representing the owner exclusively *in matters within the owner's competence.* This way, the owner would be prevented from interfering with the operative functioning of the company, in addition, scopes of responsibilities and competence would be identified more clearly.

It should not be left to a specific local government or some company regulation (rules of organization and operation, coalition agreements, deeds of foundation) to determine who and under what kind of authorization should provide for the control of companies of a local government on behalf of the owner. This should be regulated uniformly, through the law, in a manner that best protects the public interest.

The method of appointing executive officers for publicly owned companies should also be specified in the law (e.g., mandatory international tender), and they should be required to meet stringent performance criteria which the SB and the owner should call to account. Loop-holes in the public procurement procedures should be eliminated.

REFERENCES

1. Angyal (2001): Vállalati kormányzás (Corporate Governance). Aula, Budapest.
2. Frydman, R. and Rapaczynski, A. (1994): Privatization in Eastern Europe: is the state withering away? Central European University Press, Budapest.
3. O' Donovan, Gabrielle (2003): Corporate Governance International Journal, "A Board Culture of Corporate Governance", Vol 6 Issue 3.
4. Act no. IV of 2006 on Business Associations
5. Act no. CXXII of 2009
6. Deed of Foundation of BKV
7. Report of the city assembly Commission of Inquiry
8. Central Statistics Agency
9. Metropolitan Government Rules
10. World Economics Weekly archive

THE STABILIZER FISCAL POLICY AND ITS LONG-TERM EFFECTS

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ABSTRACT

This paper introduces the application of the fiscal policy in order to manage the crisis. The conclusion reached is that fiscal policies between are mainly neo-classical, i.e. expenditure reacted to the development of revenue. In the most countries counter-cyclical fiscal policies can be observed. However, as the governments there are smaller and greater the effect therefore comparably limited, this plays a key role in the economic recovery. Finally, the paper briefly discusses the similarities and differences the Hungarian crisismanagament.

JEL classification: H5, H6, E6
Keywords: fiscal deficit, fiscal policy, counter-cyclical, Keynesian fiscal policy

INTRODUCTION

Recently in response to the exceptional circumstances of the subprime crises counter-cyclical fiscal policy has become an important tool all around the world. But Hungary has chosen a unique process to ease the crisis by introducing a severe fiscal adjustment policy.

The European leaders got tired of the crisis management equally physically and mentally. They live under an incredible pressure. Is needed for one to deal own national one and with the national crisis of any of the other European countries. Is needed between conditions like this all the time to face up to questions that are totally new and surprising ones, for which they are not really prepared, They face a civilizational shock cross every day. Was heavy to recognise, that not the victims of a conspiracy, when attacks are worth the euro.

The political one and the leaders of the economic life learned that there is not a little and big country – the crisis may set out from anywhere and spreads under moments. Who are vulnerable always yet are watching us with strange predilection because of this we are. Immediately punish, and being late reward.

The role and the place of stabilizer fiscal policy

I doubt that the current crisis will be typical in its impact on deficits and debt. The reason is that, in many countries, employment and growth are unlikely to return to their pre-crisis levels in the foreseeable future. Fiscal policy can work in two general ways to stabilize the global and local business cycle. One way is through automatic stabilizers, which arise from parts of the fiscal system that naturally vary with changes in economic activity– for example, as output falls, tax revenues also fall and unemployment payments rise. Discretionary fiscal policy, on the other hand, involves active changes in policies that affect government expenditures, taxes, and transfers and are often undertaken for reasons other than stabilization (IMF 2010: 160). Skeptics argue that discretionary fiscal measures cannot be delivered quickly enough by legislatures, especially compared with the speed with

which a central bank can change its policy rate. Hence, there is a risk that fiscal stimulus will arrive just as the economy recovers from a downturn. Moreover, argue the critics, fiscal stimulus measures are not likely to be well targeted, but are likely instead to be directed to wasteful and distortionary public spending and revenue measures more responsive to the pressures of interest groups than the needs of the economy. Furthermore, they are not likely to be withdrawn sufficiently quickly to preserve fiscal sustainability. For instance, there is widespread evidence that fiscal policy in emerging and less developed economies is procyclical rather than countercyclical, in part because of political incentives to run larger deficits in good times, when financing is available (Talvi and Végh 2000: 13).

Changes in fiscal policy governance

Broader reforms could bolster the credibility of discretionary policy actions, in particular, to reduce the risk of debt bias. This might involve establishing an independent, nonpartisan government agency, such as already exist in many countries–a sort of "fiscal watchdog"–charged with identifying changes in the cyclical state of the economy, assessing the extent to which fiscal policy is consistent with medium-term objectives, and providing advice on various policy measures. This would minimize partisan judgment in the evaluation of economic information and would avoid relying solely on statistical measures of the state of the economy, which can be imprecise. In addition, this arrangement could increase the timeliness and temporariness of the fiscal impulse. Such agencies could also be entrusted with giving advice on which tax and expenditure parameters to vary, as they indeed already do in a number of countries. (IMF 2010: 187) The following financial leader of the United Kingdom, George Osborne announced a new Office of Budget Responsibility to produce growth forecasts and public finance projections ahead of the emergency Budget.

Fiscal situations and prospects

I start with Table 1. and Table 2. A key fact emerging from these tables is that over the past three years public debt has grown rapidly in countries where it had remained relatively low before the crisis. This group of countries includes not only the United States and the United Kingdom but also Spain and Ireland.

It is important to realise that, while the direct costs of financial crisis on governments may appear large, they are in fact relatively small compared to indirect costs arising from losses of tax revenues and increased expenditure to provide demand stimulus. Financial rescue programmes, including capital injection, treasury purchase of assets and lending as well as upfront government financing and a significant part of this is likely to be recovered.

By contrast, overall fiscal balances have been deteriorating sharply – by 20–30 percentage points of GDP in just three years. And, unless action is taken almost immediately, there is little hope that these deficits will decline significantly in 2011. So, in the absence of immediate corrective action, these deficits to persist even during the cyclical recovery (BIS 2010: 3)

1. table Fiscal balance as a percentage of GDP

	2007	2010	2011
Austria	–0,7	–5,5	–5,8
France	–2,7	–8,6	–8,0
Germany	0,2	–5,3	–4,6
Greece	–4,0	–9,8	–10,0
Ireland	0,2	–12,2	–11,6
Italy	–1,5	–5,4	–5,1
Japan	–2,5	–8,2	–9,4
Netherlands	0,2	–5,9	–5,3
Portugal	–2,7	–7,6	–7,8
Spain	1,9	–8,5	–7,7
United Kingdom	–2,7	–13,3	–12,5
Unites States	–2,8	–10,7	–9,4

Source: OECD 2009a

2. table General government debt as a percentage of GDP

	2007	2010	2011
Austria	62	78	82
France	70	92	99
Germany	65	82	85
Greece	104	123	130
Ireland	28	81	93
Italy	112	127	130
Japan	167	197	204
Netherlands	52	77	82
Portugal	71	91	97
Spain	42	68	74
United Kingdom	47	83	94
Unites States	62	92	100

Source: OECD 2009

Hungarian crisismanagement

Hungary was plunged into economic hardships even before the global crisis struck in 2008 by years of excessive government borrowing, culminating in an almost 10% budget deficit in 2006.

Before the global crisis hit, introducing relevant structural reforms were tabbo in Hungary. This „crisis of indecision" was based on a faulty, bad compromise between the leading political parties. They were fighting to get the vote of that part of the electorate (unemployed, retired, etc), who are living from state redistribution. In Hungary 43% of the potentially active adult population are living from social aid.

This has lead Hungary to a country which was not yet credible because of previous years' huge deficits, a country which was not growing and in a country where, because of the huge differential in domestic interest rates and international currency interest rates, the high degree of the population had taken a home loans in foreign currency, which has made the country largely exposed to foreign exchange moves. All this added up together, large debt, slow growth and large exposure to foreign currency moves has made Hungary look very vulnerable at the beginning of the financial crisis.

Recently in response to the exceptional circumstances of the subprime crises countercyclical fiscal policy has become an important tool all around the world. But Hungary has chosen a unique process to ease the crisis by introducing a severe fiscal adjustment policy. This fiscal policy manages the expenditure- and taxation system of the national economy. It investigates the realisability of the revenue appropriations and allocates these revenues, this unique, procyclical, recession-deepening fiscal attitude contributed to Hungary's economic decline.

Hungary was very quick in 2008 October to turn to the IMF. Which for many including domestic politics not only seemed to be an unusual step for a country who is a member of the European Union to turn to the IMF for a standby loan facility. But the government then was determined to do that in order to have a big enough buffer to stop the Hungarian forint from collapse.

The country has relied on a 20 billion-euro ($30 billion) International Monetary Fund-led loan since its debt-reliant economy succumbed to the credit crisis. Spending was curbed in order to comply with the fiscal terms of the bailout. Hungary's international image worsened to suggesting state collapse similar to the fate of Iceland.

By the end of the winter-early spring it was clear that unless Hungary does much more than just going to the IMF, unless Hungary does its homework then there is no way out of this crisis. Looking at the currency exchange rate, the national bank interest rate which was 11.5% and looking at the CDS spreads which have been somewhere around 630 basis points, pricing in Hungary's potential default, the country had to do something.

The main changes in fiscal policy happen once determining the budget bill. The government's top priority was to secure the passage of the 2010 strict budget through parliament. Strict budget included the abolishment of large-scale social benefits and raise of taxes, including value added tax.

One of the key elements of the new state budget is that of the execution of the budget, making the utilization of public funds and EU subsidies more transparent and controllable. Consequently the purpose of the concept of the budget management system developed by the Ministry of Finance is to introduce a new IT system, besides the reorganization of the Treasury processes. It also plans changes in the regulatory system for the central budgetary institutions. Since this adjustment has been approved and implemented the Hungarian economy has been stabilized which is quite ambitious fiscal goal in a global crisis.

Conclusion

I doubt that the current crisis will be typical in its impact on deficits and debt. The reason is that, in many countries, employment and growth are unlikely to return to their pre-crisis levels in the foreseeable future. As a result, unemployment and other benefits will need to be paid for several years, and high levels of public investment might also have to be maintained.

Fiscal policy should be used to combat business cycle fluctuations, especially downturns. Discretionary fiscal policy successfully stimulate output, but it also effects harm in the long-term, and there will be a need for fiscal consolidation, and governance improvements should reduce "debt bias" concerns related to discretionary actions. It is incredibly important that close the fiscal gap worldwide.

There is certainly a visible shift in opinion, a strenghtening confidence towards Hungary in the financial markets. Due to its non conventional crisimanagement.

I think this confidence is not fully served yet, we have, as markets were very negative to Hungary before now there are, now they have given us some advance payment of confi-

dence. Now what we need to do is now serve this advanced payment of confidence and therefore we have submitted to parliament a budget two weeks ago, which is aiming at having a budget deficit next year of 3.8%, which will be one of the lowest in Europe, the average European budget deficit at next year will be 7.3%.

REFERENCES

1. BIS 2010: „The future of public debt: prospects and implications", *Working Paper No 300*
2. IMF 2010: Studies Fiscal Policy as a Countercyclical Tool
3. OECD (2009a): *Economic Outlook*, no 86, November
4. OECD (2009b): „The effectiveness and scope of fiscal stimulus", Chapter 3, *OECD Interim Economic Outlook*, March
5. Talvi, Ernesto, and Carlos A. Végh, 2000, "Tax Base Variability and Procyclical Fiscal Policy," *NBER Working Paper No. 7499* (Cambridge, Massachusetts: National Bureau of Economic Research).

FUNGAL CONTAMINATION OF MILKING COWS FEED

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ABSTRACT

This paper present the fungal contamination of milking cows feed samples in Vajdaság. 12 Type of feed samples, used for feeding of milking cows throughout one research year was investigated. As it was found all feed samples (100%) in summer and spring were contaminated with fungi, 95% in autumn and winter period. The genus *Aspergillus* and *Penicillium* occured as contaminants in all seasons and shown the highest presence of all tested fungi species. *Aspergilli.* about 63% of feed samples in summer, 67% in autumn, 89% in winter and 48% in spring, *Peniicillium* about 87% in summer, 61% in autumn, 72% in winter and 61% in spring were contaminated with them.

INTRODUCTION

Mycotoxins occur worldwide. They occur frequently in a variety of feedstuffs (Gareis et al., 1989; Sharma and Salunkhe, 1991; Wood, 1992; Škrinjar 2008.) and are therefore routinely consumed by dairy cattle. These typically low levels of mycotoxins are associated with subclinical losses in milk production, increases in disease and reduced reproductive performance. In some cases, mycotoxin concentrations in feedstuffs are high enough to be associated with severe problems including death. The majority of human health risk from mycotoxins is from consumption of contaminated grains and nuts. Several mycotoxins have been shown to occur in the milk of dairy cattle. Concentrations are extremely low because only a small fraction of the amount consumed by a cow is transferred to milk in the parent form or as a derivative (Wood and Trucksess, 1998). Contamination of forages and cereals with mycotoxins frequently occurs in the field following infections of plants with pathogenic fungi or with symbiotic endophytes (D' Mello, 2002). The possibility of contamination may continue during the processing and storage of harvested products and feed (Adamović et al., 2005; Bočarov – Stančić et al., 2005; D' Mello, 2002). A degree of fungal and mycotoxin contamination depend significantly of environmental conditions, sach as moisture content/humidity and ambient temperature. Classical representatives of plant pathogenic species («field fungi») belonged to the genera *Fusarium, Claviceps, Alternaria* and some other genera from the *Hyphomycetes Dematiaceous* group, while *Aspergillus* and *Penicillium* exemplify storage organisms.

More than 200 species are classified into the genus *Aspergillus*. Many of them are harmful to the humans and animals. High incidents of *Aspergillus* mycotoxins are noticed in warm and humid regions, but they often occur in temperate zones, too.

In this paper the results of the occurence of *various fungi* species in feeds for milking cows feeding throughout one research year are presented.

2. MATERIAL AND METHODS

Mycological contamination of different feed samples (92) for milking cows feeding during one year in Vajdaság was examined in this work. Samples were taken from four farms throughout all seasons. Type and number of feed samples are given in Table 1.

Tab. 1. Type and number of feed samples used for feeding of milking cows throughout one research year

Type of feed	Number of feed samples			
	Summer	Autum	Winter	Spring
Hay	4	4	4	3
Dried lucerne	3	4	4	4
Concentrate	5	4	4	4
Sunflower meal	1	–	–	–
Dried corn silage	–	3	4	2
Fresh corn silage	3	–	–	2
Corn grain silage	–	–	2	3
Pelleted malt spent grains	2	3	2	1
Fresh rape leaf	–	1	–	–
Pelleted sugar beat pulp	1	3	2	4
Fresh sugar beat pulp	1	1	1	1
Fresh rape-sead leaf	–	–	–	2
Total				

2.1. Mycological investigation

Determination of total viable count of moulds per 1 g of each sample was done as well as the isolation and identification of all fungal genera. Their share in isolated mycopopulations, with toxigenic and allergic properties, was examined, too.

Total viable counts of moulds per 1g of sample was determined by standard Koch' s method. Sabouraud maltose agar (SMA) with streptomycin (0.01–0.02%) was used as an isolation medium. Incubation was carried out at 25 °C for 7 days and identification of fungal genera according to Samson and van Reenen-Hoekstra (1988).

3. RESULTS AND DISCUSSION

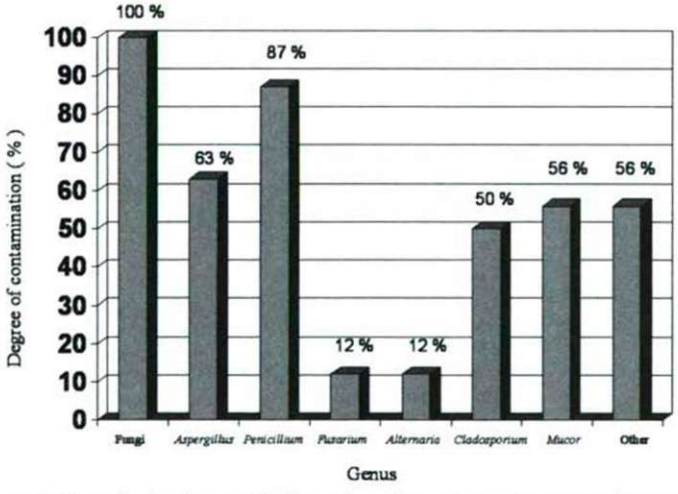

Figure 1. Contamination degree of feed samples with certain fungal genera in the summer

Summer. All of the feed samples tested in summer period were contaminated with moulds (Fig. 1) at the number ranged from 10.0 (dried corn silage) to $2.8x10^7$ /g (pelletd malt spent grains). It was found that 87% of samples were contaminated with species from the genus *Penicillium*, 63% with *Aspergillus* spp., 56% *Mucor* spp., 50% *Cladosporium* spp., 12% with *Fusarium* and *Alternaria* species. About 56% of feed samples were spoiled with fungal species which belonged to the other genera.

Autumn. As it was established (Fig 2.), about 95% of feed samples (18 of 19 total examined) contained moulds at various degree (from 70.0 – pelleted sugar beet pulp to $4.0x10^5$/g – pelleted malt spent grains). The lowest contamination was observed with *Fusarium*

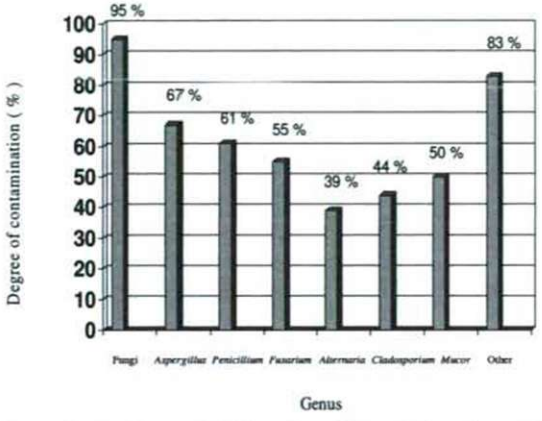

Figure 2. Contamination degree of feed samples with certain fungal genera in autumn

Winter. Total viable count of moulds in winter research period varied between 10.0 (corn grain silage) and 2.1 x 10^7/g (dried corn silage). Results of fungal contamination of feeds were approximately in conformity with those determined in autumn, figure 3.

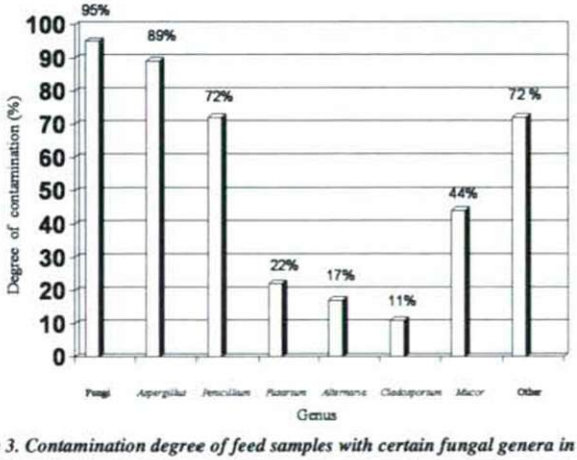

Figure 3. Contamination degree of feed samples with certain fungal genera in winter

Spring. All feed samples were contaminated with fungi again (Fig. 4). Their number varied from 20.0 (pelleted malt spent grains, fresh sugar beet pulp) to 6.1 x 10^5 in 1 g (dried lucerne).

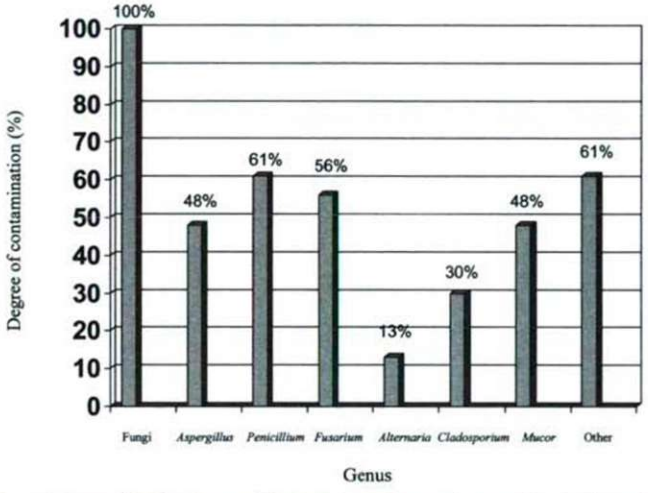

Figure 4. Contamination degree of feed samples with certain fungal genera in spring

4. CONCLUSION

All fungi species were constantly present in milking cows feeds throughout one research year The percentage in all seasons was: 100% in the summer and in the spring, 95% in autumn and winter. The highest degree of contamination (89%) with *Aspergillus* was observed in winter period, and the lowest (11%) with *Cladosporium* also at the winter. The genus *Aspergillus* and *Penicillium* shown the highest presence of all tested fungi species. *Aspergilli.* about 63% of feed samples in summer, 67% in autumn, 89% in winter and 48% in spring, *Peniicillium* about 87% in summer, 61% in autumn, 72% in winter and 61% in spring were contaminated with them.

REFERENCES

1. Adamović, M. J., Bočarov–Stančić, A. S., Đorđević, N. Ž ., Daković, A. S., Adamović, I. D. (2005): *Mycotoxins in Silage – Causes of Creating, Altermath and Protection from Acting.* Matica Srpska Proceedings for Natural Sciences 108: 51-57.
2. Bočarov–Stančić, A. S., Adamović, M. J., Đorđević, N. Ž. (2005): *Mycopopulations of Alfalfa Silage with Particular Rewiev on Toxigenic Fusarium spp.* Matica Srpska Proceedings for Natural Sciences 108: 59–67.
3. D' Mello. (2002): *Microbiology of Animal Feeds.* FAO Electronic Journal No. 160.
4. Gareis, M., J. Bauer, C. Enders and B. Gedek. 1989. Contamination of cereals and feeds with fusarium mycotoxins in European countries. In: fusarium Mycotoxins, Taxonomy and Pathogenicity (J. Chelkowski, ed.). Elsevier, Amsterdam, p. 441.

5. Sharma, R. P. and D. K. Salunkhe. 1991. Occurrence of mycotoxins in foods and feeds. In: Mycotoxins and Phytoalexins (R. P. Sharma and D. K. Salunkhe eds.). CRC Press, Inc., Boca Raton, Florida, p. 13.
6. Škrinjar, M.: *Fungal and mycotoxin contamination of some food industry byproducts.* 25th Food Technology Days 2008, «By-products and wastes in food processing-utilization and Ecology», Ljubljana, Slovenia, April 17–18, 2008, Proceedings, 73–84. pp.
7. Trucksess, M. W., F. Thomas, K. Young, M. E. Stack, W. J. Fulgueras and S. W. Page. 1995. Survey of deoxynivalenol in U.S. 1993 wheat and barley crops by enzyme-linked immunosorbent assay JAOAC Int. 78:631.
8. Wood, G.E. 1992. Mycotoxins in foods and feeds in the United States. J. Anim. Sci. 70:3941

NEW PARADIGM: EVOLUTIONAL APPROACH IN THE ECONOMIC GEOGRAPHY

„THEORETICAL LOCATION OF THE EVOLUTIONARY ECONOMIC GEOGRAPHY IN THE INTERDISCIPLINARY SPACE"

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ABSTRACT

In recent years the evolutional approach has been penetrating into several disciplines. The extended darwinian mechanism (*variation, novelty, inheritance and selection*) can be found in the field of psychology, medicine, informatics, sociology and economics. According to scientists (*e.g.* Boschma, Martin, Witt) it would be fruitful to interlock the evolutionary approach with the economic geography. In this paper I want to summarize the latest issues, the newest achievements in the evolutionary economic geography.

1. INTRODUCTION

According to Ernst Mayr (Mayr 1997, Marosán 2005) the emergence of the evolutionary view in the sciences is an inevitable process. Mayr divides the development of the sciences in three parts: the process of cognition or knowledge starts from the question of „*what*", then reaches the question of „*how*" and finally puts the question of „*why*" (Marosán 2005: 53).

First there is the definition of the notions, the formation of the axiomatic system, the creation of the operational rules. Then the science tries to explore relationships, the connections between notions, and find answers why the given phenomenon exists or develops. The evolutionary approach could be an adequate method to find satisfying answers to the „why is it so?" questions (Marosán 2005: 54).

In line with the discrete development of sciences we can identify the co-evolution with other part of the disciplines, the emergence of the interdisciplinarity, the so called „hybridization". These hybrid bournes, fields create succesful and more viable paradigm(s) with higher probability, which paradigm better explains the notions, the phenomena, the coherences (Soós 2005: 41).

2. THE EVOLUTIONAL APPROACH IN THE ECONOMIC GEOGRAPHY

In the consequence of the extension of globalization, the localization of the competitive features, the bottleneck of the resources, the financial and economic crisis and other factors there are new expectations and the economic geography has to react, respond to changing circumstances and conditions.[1] The economic geography is a continually evolving study. On the following figure I will demonstrate contextually the features of the three main approaches used in the economic geography according to Boschma and Frenken (Boschma–Frenken 2005). These are the Institutional, the „New Economic Geography" and the Evolutional view.

[1] About the relevance of the economics see: Solow, R. M. (1972): *Science and ideology in economics*. In: *The Public Interest* 1971/23 (*Nobel laureate*)

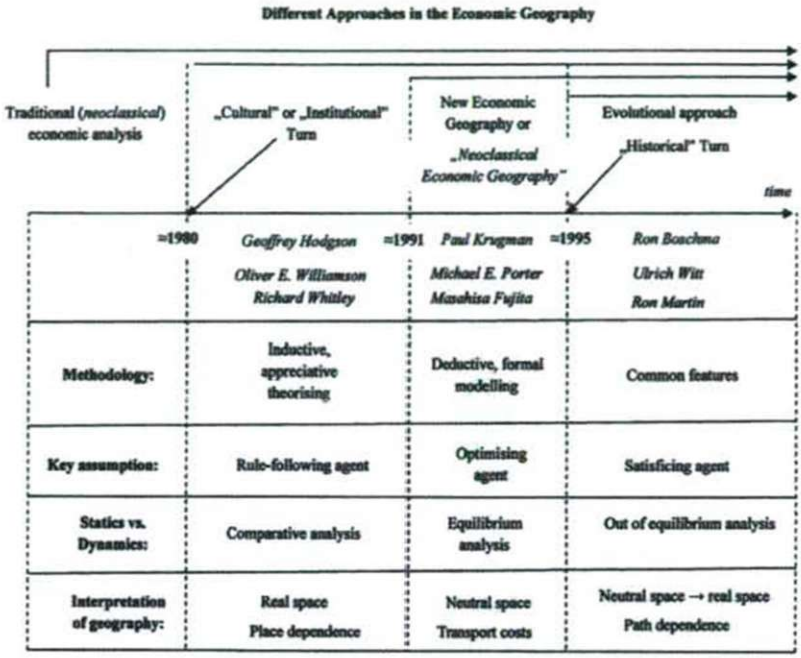

Figure 1. Different approaches in the Economic Geography. *Source: Boschma–Frenken 2005*

In *Figure 1.* I illustrate the different views in context of time and the main characteristics. Nowadays the conceptions exist paralell. The „cultural" or in other words the „institutional"[2] turn broke the hegemony of the traditional, neoclassical analysis, and took over some methods from sociology, politology and other cultural sciences, so it had been getting more interdisciplinary. With the leadership of Nobel laureate Krugman the neoclassical economist got started to study again the spatial processes, and „rediscovered" the importance of geography. The „new economic geography" term was proposed by Krugman, but Martin, Boschma and Frenken prefer the „neoclassical economic geography" expression referring to the pre-Krugman era, and the similar assumptions and methods with traditional economic analysis (Martin 1999, Boschma – Frenken 2005). The „historical turn" refers to the importance of „history" and economic development in economics over time. Dosi said reflecting to this process: „…the explanation to why something exists intimately rests on how it became what it is" (Dosi 1997: 1531). Below some prominent authors are listed, whose contributions were determinative. Hereinafter some basic features are categorised according to the theory such as methodology, key assumption, the interpretation of time and geography.

Henceforth I will merely deal with the evolutional pathway. In case of the economic geography too we have to put the above mentioned questions: *what* are the notions, the phenomena; *how* are they connected to each other; and *why* does the given system exist or what is the origin of it, and how had it been coming to existence. For instance notion could be the region, competitiveness, Gross Regional Product, globalization, localization, knowledge, innovation and so on.

[2] Similar institutional approach exists in economics.

On the second level the science analyzes the context of these notions, and finally tries to understand and describe why *e.g.* a succesful region exists and how it had been developing over time. In evolutionary economic geography these processes are mainly explained by the evolutional method (*generalised darwinism*) (Hodgson–Knudsen 2006). If we speak about evolutionary process in economic sense, this theory has to meet three requirements: 1. The system must be *dynamical*, where the key notion is the changing process over time, 2. These processes are *irreversible*, 3. The generative effect of *novelty*, which evokes the self-transformation of the economy (Witt 2006, 2008, Schubert 2009, Boschma–Martin 2010).

In evolutionary perspective it is indispensable to understand in details the most important, relevant phenomena:

- spatial technological processes,
- competitive advantages,
- economic restructuring,
- economic growth,
- agglomeration of economic activities,
- sources of increasing returns,
- spatial distribution of routines over time,
- creation and diffusion of new routines and economic novelties (innovation, knowledge, new firms, networks, industries).

Routine according to Boschma (Boschma–Frenken 2005) can be *e.g.* organisational skills, experience knowledge (learning-by-doing) and tacit knowledge. These routines can derive from or can be changed by learning, innovation, R&D, routinised behaviour, relocation. See also Nelson and Winter (Nelson-Winter 1982).

The new paradigm in question is a really „*hybrid*" study. Boschma and Martin speak about „cross-disciplinary co-operation", while Dopfer and Potts use the term „massive hybridisation of theory"(Dopfer–Potts 2004). Accepting the main statements[3] of the *European Science Foundation Workshop on Evolutionary Economic Geography* (University of Cambridge 2006) we can assess, that there are three pillars of the EEG,[4] which pillars cover the most relevant theoretical frameworks. The first pillar is the *Generalised Darwinism* from the modern evolutionary biology. This can be characterized by the notions: variety, novelty, selection, fitness, mutation and population dynamics thinking. The second pillar is the *Theory of Complexity*: far-from-equilibrium analysis, complex, adaptive systems, self organisation. The third is the *Path Dependence Theory*. The most important features are the role of contingency, self reinforcing dynamics, lock-in by increasing returns, path creation. The EEG attempts to combine these methods on three levels of aggregation (micro, meso and macro level) according to the examined issue. Micro level is *e.g.* firms, routines, meso level is defined on sectors, networks, clusters, and finally the macro level is dealing with spatial systems, regions (Boschma – Frenken 2005: 19).

Though the EEG is a promising opportunity of scientific cognition it has got still some deficiency:

- the adequate definition of notions and the suitable axiomatic system are still missing,
- the theory of biological evolution has to face with enormous attacks (*creationism, intelligent design*),[5]
- it is not so robust and accepted as the neoclassical approach,
- it is not predictive,

[3] See more: Boschma, R. (*editor*)(2010): The Handbook Of Evolutionary Economic Geography. Edward Elgar Publishing 2010 August In process.

[4] Abbreviation of the Evolutionary Economic Geography.

[5] See: Dembski, W. A. 1997: Intelligent Design as a Theory of Information. Center for the Renewal of Science and Culture.

3. CONCLUDING REMARKS

The Evolutionary Economic Geography is a new stream in economic geography. In consequence of the incessant change of external factors or variables such as global and local trends, increasing competition, interests, relevancy, the economics and other social sciences have to answer new questions and give new explanations: hereby competitive advantages can be created. The better is the adaption of the new theory in practice on several levels of aggregation (*firms, clusters, regions...*), the more success (*GDP per capita*) can be reached.

REFERENCES

1. Boschma, R. A.–Frenken K. (2005): Why is Economic Geography not an Evolutionary Science? Towards an Evolutionary Economic Geography. In: Papers in Evolutionary Economic Geography 2005. 01.
2. Boschma, R. A.–Martin R. (2010): The Aims and Scope of Evolutionary Economic Geography. In: Papers in Evolutionary Economic Geography 2010. 01.
3. Dopfer, K–Potts J. (2004): Evolutionary realism: a new ontology for economics. In: Journal of Economic Methodology 11, 2, pp. 195–212.
4. Dosi, G. (1997): Opportunities, incentives and the collective patterns of technological change. In: The Economic Journal, 107 (444): 1531–1547.
5. Hodgson, G. M.–Knudsen T. (2006): Why we need a generalized Darwinism, and why generalized Darwinism is not enough. In: Journal of Economic Behavior & Organization. Vol.61. (2006) 1–19.
6. Marosán, György (2005): Az evolúció, mint a társadalomtudományok metaelmélete. In: Világosság 2005/1.
7. Martin, R. (1999): The new „geographical turn" in economics: some critical reflections. In: Cambridge Journal of Economics 23 (1): 65–91.
8. Mayr, Ernst (1997): This Is Biology: The Science of the Living World. Harvard University Press.
9. Nelson, R. R.–Winter, S. G. (1982): An evolutionary Theory of Economic Change. Cambridge MA and London: The Belknap Press.
10. Schubert, C. (2009): Darwinism in Economics and the Evolutionary Theory of Policy-Making. In: The Papers on Economics and Evolution, Max Planck Institute of Economics.
11. Soós, Sándor (2005): A tudomány evolúciós rendszertana és az extradiszciplinaritás problémája. In: Világosság 2005/1.
12. Witt, Ulrich (2006): Evolutionary Economics. In: The Papers on Economics and Evolution, Max Planck Institute of Economics.
13. Witt, Ulrich (2008): What is specific about evolutionary economics? In: Journal of Evolutionary Economics.

FUNCTION APPROXIMATION FOR THE FORCE GENERATED BY DIFFERENT FLUID MUSCLES

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ABSTRACT

The main disadvantage of the pneumatic artificial muscles (PAMs) is that their dynamic behaviour is highly nonlinear. Designing an adequate control mechanism for this highly non-linear system needs precise modelling. This paper presents our new, accurate and simple approximation model of PAM, comparing with measured and literary data.

1. INTRODUCTION

Many researchers have tried to find an actuator similar to human muscles. The most promising actuator in this field of research is undoubtedly the McKibben pneumatic muscle actuator. The McKibben muscle was invented in the 1950's by physician Joseph L. McKibben to help the movement of polio patients and to motorize pneumatic arm orthotics. There exists several types of artificial muscles that are based on the use of rubber or some similar elastic materials, such as the McKibben muscle, the Rubbertuator made by Bridgestone company, Air Muscle made by Shadow Robot company, Fluid Muscle (Figure 1.) made by Festo company, Pleated PAM developed by Vrije University of Brussel, ROMAC (RObotic Muscle ACtuator), Yarlott and Kukolj PAM and some others [1].

A pneumatic actuator consists of an internal rubber bladder surrounded by a braided shell with flexible yet nonextensible threads according to a helical weaving that is attached at either ends. When inflated, the internal bladder tends to expand, with a consequent increase in the angle between the helical woven fibres of the braid and the axis of the tube and a decrease in axial length [2].

Figure 1. Fluid Muscles made by Festo

The Fluid Muscles type DMSP-20-400N-RM-RM (with inner diameter of 20 mm and initial length of 400 mm) and DMSP-10-250N-RM-RM (with inner diameter of 10 mm and initial length of 250 mm)produced by Festo company were selected for our newest study.

The layout of this paper is as follows. Section 2 (Materials and Methods) is devoted to display our test-bed for investigation of pneumatic muscle and to demonstrate the model of force as a function of pressure and length (contraction). In section 3 (Results and Discussion), we presents our new approximation algorithm and gives some comparisons for measured and literary data. Finally, section 4 (Conclusions and Future Work) gives the investigations we plan.

2. MATERIALS AND METHODS

Good descriptions of our test-bed (Figure 2.) and experimental results can be found in [3].

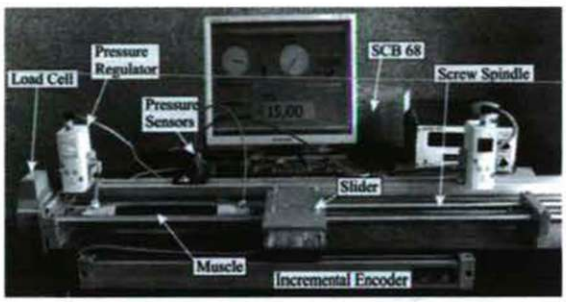

Figure 2. Experimental setup for investigations of PAMs

With the help of this test-bed we can investigate one muscle and two muscles or muscle-spring system in antagonistic setup.

The general behaviour of PAM with regard to shape, contraction and tensile force when inflated depends on the geometry of the inner elastic part and of the braid at rest, and on the materials used (Figure 3.) [4].

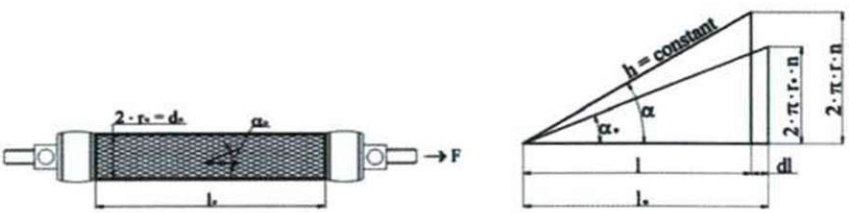

Figure 3. Geometry parameters and orthotropic material layers of PAM

On the basis of [5] and Figure 3., the force can be calculated:

$$F = \pi \cdot p \cdot r_0^2 \cdot \left(\frac{3}{tg^2 \alpha_0} \cdot \frac{l^2}{l_0^2} - \frac{1}{\sin^2 \alpha_0} \right) = \pi \cdot p \cdot r_0^2 \cdot (a \cdot (1-\kappa)^2 - b) \qquad (1)$$

$$\text{with } a = \frac{3}{tg^2 \alpha_0}, \quad b = \frac{1}{\sin^2 \alpha_0} \text{ and } \kappa = \frac{l_0 - l}{l_0}$$

Where: F the pulling force, p the applied pressure, r_0, l_0, α_0 the initial inner radius and length of the PAM and the initial angle between the thread and the muscle long axis, r, l, α the inner radius and length of the PAM and angle between the thread and the muscle long axis when the muscle is contracted, h the constant thread length, n the number of turns of thread and κ the contraction.

Equation 1 is based on the admittance of a continuously cylindrical-shaped muscle. The fact is that the shape of the muscle is not cylindrical on the end, but rather is flattened, accordingly, the more the muscle contracts, the more its active part decreases, so the actual maximum contraction ration is smaller than expected.

Tondu and Lopez in [5] consider improving equation 1 with a correction factor (ε), on the one hand, it does not pay attention to the material that the muscle is made of, and on the other hand, it predicts for various pressures the same maximal contraction. This new equation is relatively good for higher pressure ($p \geq 2$ bar). Kerscher et al. in [6] suggest achieving similar approximation for smaller pressure another correction factor (μ) is needed, so the modified equation is:

$$F(p,\kappa) = \mu \cdot \pi \cdot p \cdot r_0^2 \cdot (a \cdot (1 - \varepsilon \cdot \kappa)^2 - b) \tag{2}$$

$$\text{with } \varepsilon = a_\varepsilon \cdot e^{-p} - b_\varepsilon \text{ and } \mu = a_\kappa \cdot e^{-\kappa \cdot 40} - b_\kappa$$

3. RESULTS AND DISCUSSION

The working principle of the Festo Fluid Muscle is similar to the McKibben muscle, so the previous models for the dependence between force, pressure and contraction of the McKibben can be used. Firstly, we compared the measured data and force model using equation 1.

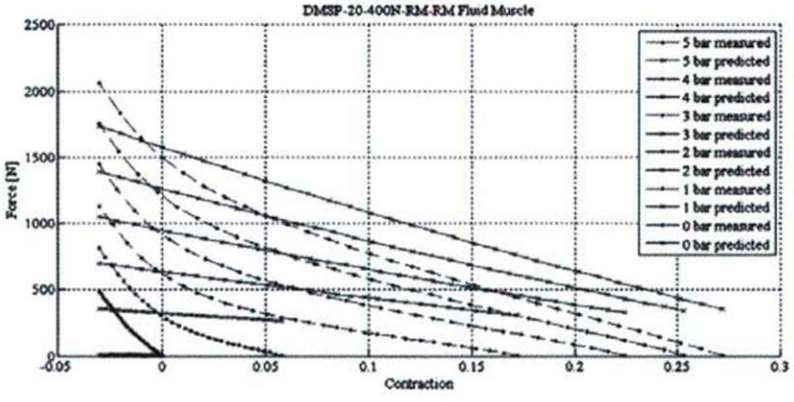

Figure 4. Comparison of measured data and force model using equation 1

As it is shown in Figure 4., there is only one intersection between the measured and calculated results and no fitting.

In the interest of fitting we repeated the simulation with equation 2. The coefficients (a_ε, b_ε, a_κ and b_κ) of equation 2 were found using genetic algorithm in MATLAB (Figure 5.).

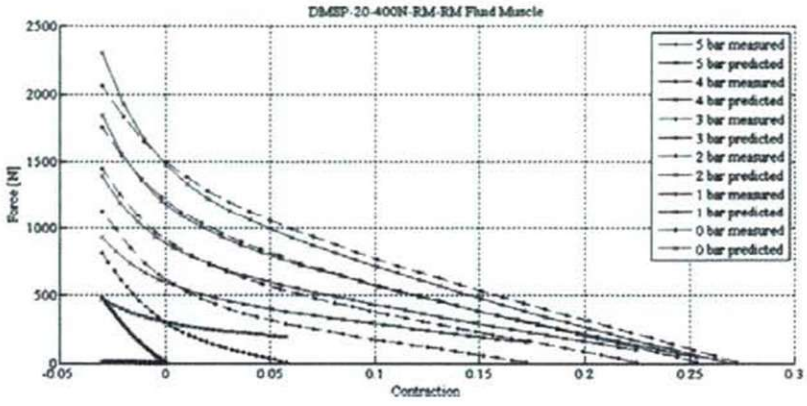

Figure 5. Comparison of measured data and force model using equation 2

Figure 5. shows the measured and predicted results still do not fit, for this reason we had to widen the search parameters of the genetic algorithm. With the help of it, a better fitting was attained (Figure 6.), but at a pressure of 0 bar we still have a rather substantial inconsistency.

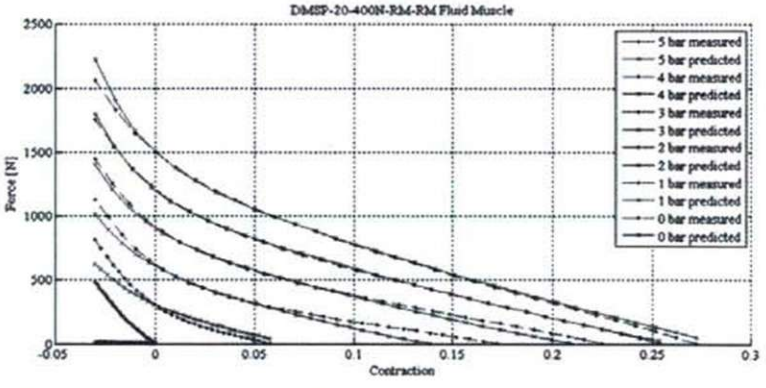

Figure 6. Comparison of measured data and force model using equation 2 with the widening of the search parameters

In the interest of better fitting under different pressures including 0 bar we have introduced a new approximation algorithm:

$$F(\kappa) = a \cdot e^{(b \cdot \kappa + c)} + d \cdot \kappa + e \tag{3}$$

Under fixed pressure the contraction to force function can be approximated with a general exponential function with first order correction polynomials of contraction.

To make our equation 3 universal meaning usable under various pressures we needed to make the algorithm vary from pressure:

$$F(p,\kappa)=(a\cdot p+b)\cdot e^{(c\cdot\kappa+d)}+(e\cdot p+f)\cdot\kappa+g\cdot p+h \tag{4}$$

The unknown *a, b, c, d, e, f, g* and *h* parameters can be found using genetic algorithm, too. The fitting with the 8 parameters received from the algorithm can be seen in Figure 7.

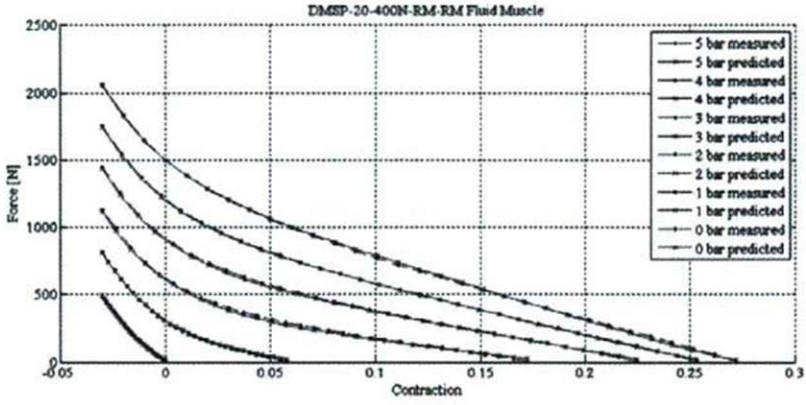

Figure 7. Comparison of measured data and force model using equation 3

As we can see we have consistent fitting even at a pressure of 0 bar.

Chou and Hannaford in [7] report hysteresis to be substantially due to Coulomb friction, which is caused by the contact between the bladder and the shell, between the braided threads and each other, and the shape changing of the bladder. An experiment was made to illustrate the hysteresis (Figure 8.).

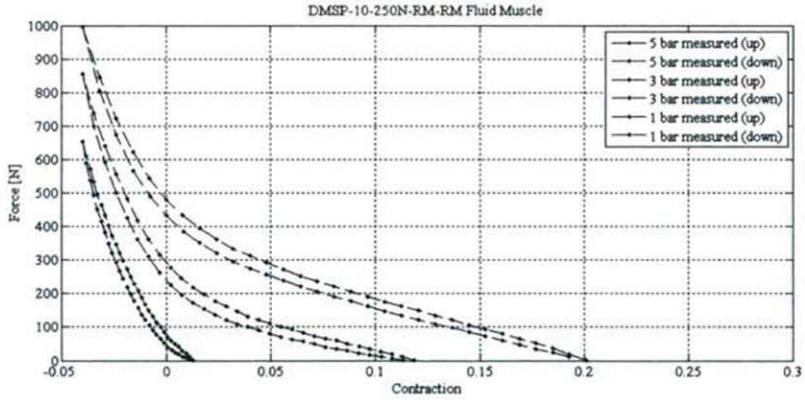

Figure 8. Hysteresis in the tension-length (contraction) cycle

To prove versatility of equation 4, another comparison was done between the measured data and force model. The accurate fitting is demonstrated in Figure 9.

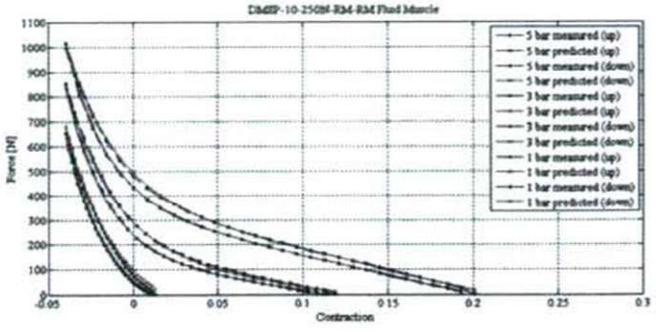

Figure 9. Approximation of hysteresis loop

4. CONCLUSION AND FUTURE WORK

In this work a comparison of theoretical and measured forces generated by pneumatic artificial muscle has been shown. As we can see there is a substantial difference between the measured and predicted forces, for this reason we had to develop a radically new equation based on purely statistical approach. With the help of it precise curve fitting can be proven for any fluid muscles. Our goal is to develop a new mathematical model for pneumatic artificial muscles on the basis of our approximation model and to construct a prosthetic arm with PAMs, because these muscles seem a better choice than present day electric or other drives.

REFERENCES

1. Situm, Z., Herceg, Z. (2008): Design and control of a manipulator arm driven by pneumatic muscle actuators. 16th Mediterranean Conference on Control and Automation, Ajaccio, France, 25–27. June, 2008, 926–931. p.
2. Plettenburg, D. H. (2005): Pneumatic actuators: comparison of energy-to-mass ratio's. Proceedings of the 2005 IEEE, 9th International Conference on Rehabilitation Robotics, Chicago, IL, USA, 28. June –1. July, 2005, 545–549. p.
3. Sárosi, J., Gyeviki, J., Szabó, G., Szendrő P. (2010): Laboratory investigations of fluid muscles. *Annals* of Faculty of Engineering Hunedoara, International Journal of Engineering, 2010:8, 137–142. p.
4. Daerden, F. (1999): Conception and realization of pleated artificial muscles and their use as compliant actuation elements. PhD Dissertation, Vrije Universiteit Brussel, Faculteit Toegepaste Wetenschappen Vakgroep Werktuigkunde, 9 p.
5. Tondu, B., Lopez, P. (2000): Modelling and control of McKibben artificial muscle robot actuator. IEEE Control System Magazine, 2000:20, 15–38. p.
6. Kerscher, T., Albiez, J., Zöllner, J. M., Dillmann, R. (2005): FLUMUT – Dynamic Modelling of Fluidic Muscles using Quick-Release. 3rd International Symposium on Adaptive Motion in Animals and Machines, Ilmenau, Germany, 25–30. September, 2005, 6 p.
7. Chou, C. P., Hannaford, B. (1996): Measurement and modeling of McKibben pneumatic artificial muscles. IEEE Transactions on Robotics and Automation, 1996:12, 90–102. p

CONNECTION BETWEEN THE GRINDING ENERGY DEMAND AND THE WHEAT KERNEL HARNESS

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ABSTRACT

Wheat kernel texture differentiates cultivars of hard and soft wheat classes. The kernel hardness is a genetic factor (control by friabilin protein). The friabilin presents in high concentration in soft grain varieties and low concentration in hard grain varieties. Wheat kernel hardness determines quality, flour yield, flour particle-size, water absorption and other quality characteristics of cereals.

The aim of our research was to determine the kernel hardness. We used the Perten Single Kernel Characterization System (SKCS) 4100 device and Perten 3303 laboratory mill. Registered and widely used Hungarian wheat varieties were applied in the study. It was 11 different winter wheat varieties. As a result, we found correlation among the results.

1. INTRODUCTION

The most important corn in the ear is the wheat. It gives almost half of the produced amount of grain. It is grown in each of our nineteen counties. Best quality crop is produced in Békés-, Szolnok-, Hajdú-, Bács-, Pest counties and in Mezőföld and Kisalföld.

In the past 20–25 years , the interest in connection with commercial assortment, has grown considerably. Among from the previously mentioned emerges the significance of endosperm classification, rating according to the inner structure of the kernel. At wheat rating, postulating the inner structure of the kernel, it is extremely important that kernel hardness is the dependant of many properties in connection with the grain's technological quality. The system of endosperm classification of wheat means essential advantage for all participants of the wheat varieties, from the grower, through the dealer to the user (Békés 2001).

For the determination and measuring of the endosperm structure, kernel hardness indicators were made, which measures the power needed to snap a seed. With this method, they determine a ration: Hardness Index (HI), which is one of the bases of mill crop's acceptance qualification.

Kernel hardness reliant assortment, and the quality acceptance is essential for the companies, and this is why the identification of hardness that can be automate able if is so necessary.

Kernel hardness is an important measurable attribute of wheat that has been correlated to it's chemical and genetic make-up. The evaluation of wheat kernel hardness has been used in predictions of flour yield and gives early indication of baking performance (Pomeranz and Williams, 1990). Factors influencing kernel hardness include variety and environment; however the total variation in hardness has yet to be explained.

2. OBJECTIVES

The primary objective was to determine the nexus between the specific grinding energy demands (Perten 3303 laboratory mill), during the fracture of grains with the help of a disc grinder, and between the Hardness Index (Perten SKCS 4100).

3. MATERIALS AND METHODS

In the course of our experiments, we examined 11 different wheat samples. Out of these samples 4 sets can be classified as soft and 7 as hard grain structured. This numeral difference is due to that one of the aims of weed sublimation, is to sublimate hard wheat, and because of this, softer sets become insignificant.

The samples were provided by the Cereal Research NPC, Szeged, in Hungary, and included the following varieties: GK Garaboly, GK Békés, GK Kalász, GK Verecke, GK Holló, GK Ati, GK Petur, GK Nap, GK Élet, GK Csongrád, GK Hattyú. The samples were code labelled.

3.1. Determining the kernel hardness by Perten SKCS 4100 equipment

During the measurement, the instrument (Figure 1.) measures the weight, size, moisture content and the hardness of the kernels. After determining 300 kernels unique properties it counts the average of the data gathered and counts standard deviation value and also, there is an opportunity to illustrate the measured results in column charts. The program provides an opportunity to see the last results after the following measurement. The measured results and their histograms can be printed if wished. The Hardness Index, produced by the machine as final results, is a physically non determined ratio, so in extremes cases the outcome can be zero or negative value.

Figure 1. Perten Single Kernel Characterization System (SKCS) 4100 device

3.2. Valuation of grinding and performance

For the valuation of cutting and performance, we used a Perten 3303 laboratory mill (Figure 2.). We poured the sample into the mill's pharynx, than we started the discs and by pulling the bolt, we started the mincing. The measurement lasted for a minute, under which we recorded it's cycle time, the mincing mass stream and the electric energy. We measured the power consumption (W) and the energy use (Ws), needed for the mincing on a monophase Power Monitor PRO power meter instrument, and the mincing time with a stopwatch. We measured the weight of the grist, produced in the mincing, with an electric scale, and we carried out the sieve analysis. For the grist's sieve analysis we used a labora-

tory sieve row and a shaking machine. With the help of the specific milling labour (e_d – kWh/t) and the formed grists specific increase in surface area (Δa_d – cm^2/g), specific grinding energy demand (e_f – kWh/cm^2) can be calculated.

Figure 2. Perten 3303 laboratory mill

For the evaluation we used STATISTICA for Windows 6. (StatSoft Inc. USA) and Excel table manager program.

4. RESULTS

We tested the samples, which had 13.52% moisture content – Table 1.

Table 1. Selected technology parameters of the entries in the study ("B" sample, 13.52% moisture content)

Code	Wheat moisture cont. (%)	Flour yield (%)	Water Absorption Capacity (%)	Wet gluten (%)	Alveograph (P) (mm)	Alveograph (L) (mm)	P/L	Alveograph (W) ($x10^{-4}$ J)
B1	13,27	71,88	54,80	21,58	43,15	60,50	0,715	95,05
B2	13,86	71,79	57,30	27,48	60,75	77,00	0,790	179,85
B3	14,01	74,01	54,00	16,85	45,75	50,75	0,905	99,40
B4	14,00	68,33	56,60	25,30	55,90	68,75	0,815	128,85
B5	13,90	72,89	60,90	28,13	77,00	89,00	0,875	250,20
B6	13,85	71,28	61,40	22,88	105,01	42,75	2,460	187,35
B7	13,58	70,16	63,20	33,68	87,80	70,00	1,355	214,75
B8	13,37	70,96	67,90	31,70	93,15	59,50	1,565	176,80
B9	13,15	67,94	66,80	35,60	94,30	66,50	1,430	226,85
B10	12,82	70,46	63,00	29,68	102,55	53,00	1,960	225,20
B11	12,92	69,66	56,90	31,08	55,40	66,50	0,835	156,35

The Perten 3303 milling machines is a disc grinder, the grinding is between a serrulate moving disc and serrulate standing disc. The grinding controls with the distance of disc. There are six positions (0-6), we choose the 0,3,6 positions. There was different energy demand. The smallest position (0) has a biggest energy demand in the Perten 3303 milling machines; the 3 position has the middle and the 6 position has a least energy demand.

We made a trial test to determine that the laboratory mill is a good machine to separate (in connection with the kernel hardness) the wheat.

We used three samples (GK Mérő, GK Őthalom and Jubilejnaja 50) to determine en-

ergy demand. The Figure 3 shows that the three energy demands are different and it is significant. The e_d (kWh/t) is the specific grinding energy consumption, the „specific punch", which determine the physical behavior of materials. So the laboratory mill is a good device to sort the grain in two groups (soft, hard).

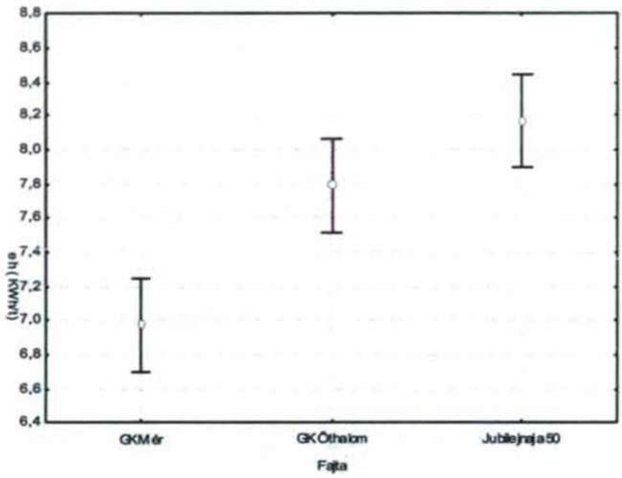

Figure 3. The Perten mill useful energy demand confidential interval

The Table 2. shows the results of the two machines. We measured the grinding energy with the "0" position.

Table 2. The results of Hardness Index and grinding energy ("B" sample, 13.52% moisture content)

Code	SKCS 4100 (HI)	Perten mill Grinding energy (mWh/cm³)
B1	27	0,235
B2	36	0,245
B3	20	0,215
B4	29	0,255
B5	61	0,440
B6	57	0,435
B7	67	0,465
B8	81	0,555
B9	81	0,545
B10	81	0,535
B11	68	0,470

5. DISCUSSION

In case of sample set "B" with the average moisture content of 13.5%, the Hardness Index of the set of wheat, defined by meter SKCS 4100, and the specific grinding energy demand, we can find a very close correlation (Figure 4.). The significant level was 95%.

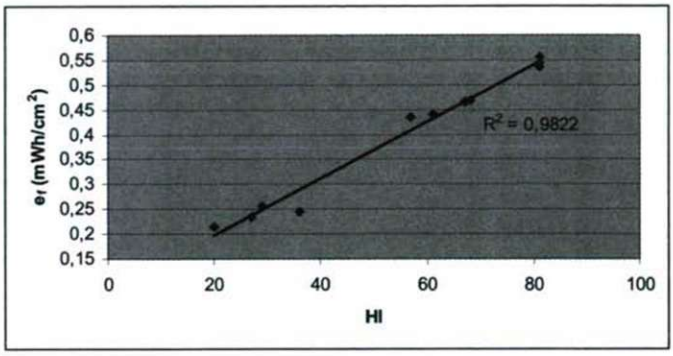

Figure 4. Connection between specific grinding energy demand (e_f) and the Hardness Index (set "B", moisture content: 13.52%)

6. CONCLUSIONS

A very strong correlation was found in the case of 11 different (4 soft and 7 hard) varieties with a 13.5% moisture content in average between the Hardness Index measured by SKCS 4100 type equipment and the specific grinding energy demand measured by Perten 3303 disc type mill (R^2 = 0,982). Two good define results were found, which can use in practice.

REFERENCES

1. Tanács L. (2003): Élelmiszerek növényi eredetű nyersanyagai, SZTE-SZÉF jegyzet, 6–22. p.
2. Békés, F. (2001): A búza endospermium szerkezetének szerepe néhány minőségi búzát termelő országban, CSIRO Division of Plant Industry, Canberra, Ausztrália, http://www.elitmag.hu/informaciok/szakcikk/endosper.htm.
3. Pomeranz Y.–Williams P. C. (1990): Wheat hardness: its genetic, structural and biochemical background, measurements and significance. In: Advances in Cereal Science and Technology, AACC, St. Paul, vol. X: 471–544.
4. Greffeuille V., Abecassis J., Rousset M., Oury, FFaye A., Bar L 'Helgouac'h, CLullien-Pellerin V. (2006): Grain characterization and milling behaviour of near-isogenic lines differing by hardness. Theor. Appl. Genet. 114:1–12.
5. Gyimes E. (2004): Összefüggés-vizsgálatok búzafajták szemtermésének agrofizikai tulajdonságai között, Doktori (PhD) értekezés. Mosonmagyaróvár (PhD thesis, in Hungarian).

THE ORGANIZATIONAL JUDGMENT OF THE LEADERSHIP MISTAKES RELATED TO WORK SAFETY IN THE AGRICULTURAL UNDERTAKINGS

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ABSTRACT

The vital factor in the life of a given organization is the safety of workers, the advanced safety culture and the daily optimum safety climate. The author's research area is the safety culture and safety climate. In this paper the author published the results of the examination dimension of mismanagements' effects on occupational safety and health (OSH). The author examined the perceptions and judgments of leaders and workers in 18 agricultural organizations. The author draws attention to the continuous transmission of the organizational official safety attitudes and values by the leadership. He found that the representatives of various management levels give greater importance from the mismanagement factors which on their own managerial level their competence is expressed. The first-level managers have felt the greatest responsibility in their judgment in connection with occupational safety mismanagement factors. The author found that the safety management functions are mainly delegated on first-level managers in the examined organizations. In the issuing of the security tasks and in the safety information transmitting the leading style is a very important factor. It is important to have greater emphases on interpersonal skills development of first-level managers mainly in connection with safety management tasks.

1. INTRODUCTION

The advanced safety culture and the daily optimal safety atmosphere are the indispensably important factors of the work safety in a given farming organization. The organizational leadership play a very important role in the formation and maintenance of these factors. Good performances of the managerial tasks have generally positive effect on work safety and safety climate within the organization. At the same time wrong and/or deficient performances, may have negative effect on work safety. One of the indicators of this phenomenon inside the organisations is the change of labour protection safety climate. The safety climate has many dimensions, which are mostly connected with human factors of the organisation's safety culture. According to Zohar (1980), safety climate is the sum of the employees' perceptions on the organization and its numerous peculiarities. These safety perceptions have direct effect on the prevention of accidents and on safety behavior. Zohar (1980) also stated that the safety climate is a safe type of organizational climate. It means that he compares the safety climate mainly to such organizational climate where the central elements are the safety and the safe working environment. Based on this interpretation, many definitions were developed in the past years that emphasise the human factors of safety climate. For example Brown and Holmes (1986), and Cooper and Philips (1994) have mainly emphasized the role of safety perceptions and beliefs, while Dedobbeleer and Béland (1991) have somewhat limited these dimensions to the working environment. Later Niskanen (1994) put the emphasis primarily on the official organizational safety commit-

ments. In his conceptualization the safety climate can be identified as a characteristic set, which is perceptible in a specific working organization and was developed from the organization's policies and practices, and that applies to the workers and supervisors. Cabrera et al. (1997) found similar patterns, but they interpreted it from the organization members' point of view. It is clear from their statements that the safety climate is actually a provisional and/or current status of the safety culture. The current status of the safety culture we can be inferred from the qualitative and quantitative surveys of the visible and perceptible human behavioral components of the safety culture. By this means, the important dimensions of safety atmosphere status examinations are the perceptions, opinions and judgments of the organization's members regarding the managerial safety commitments, and the judgments of the OSH related managerial tasks. This proves that these dimensions have relevant effect mainly on the safety behavior. Juhász and Demcsák (2006) suggests that employees take into consideration the leaders' intentions and actions regarding their work and personality, especially if the leaders reinforce trust and understanding. Therefore, it is very important that leaders pay special attention on the quality of managerial work while performing their tasks (Berde, 2001). By doing so they can reinforce the current organizational safety expectations towards employees.

2. MATERIALS AND METHODS

In this paper I examined 18 agricultural organizations in Hajdú-Bihar County. One of the main aims of the examination was to measure the safety culture related perceptions of farm-workers and their leaders. In order to do so, I conducted 460 personal interviews with farm-workers and 92 personal interviews with leaders. For the interviews I used questionnaires which contained closed questions and statements. To the characterization and evaluation of the qualitative factors a Liker-type scale (–3...0...+3) (Malhotra, 2005) was used. The dimensions of safety culture and atmosphere what the research examined were sense of risk, safety related attitudes, values, optimism, pessimism, contentment with the OSH conditions, etc. The main consideration in the compilation and arrangement of the questionnaire was to choose such statements that are in close connection with the examined OSH related safety culture and atmosphere dimensions. One of these research dimensions is the judgment of leadership mistakes. To the assessment of the collected data I applied descriptive statistics and related hypothesis examinations.

3. OWN RESULTS

3.1. Leaders judgment

For the elaboration of the subject I have selected those managerial tasks which are directly affected by managing processes of production and services and within this, safety management. Thus, in one hand, I had questions regarding the elements of process management tasks – planning, decision making, direction, organization and supervision (10.2., 10.3., 10.5., 10.10.). On the other hand I have selected some factors from the human resource management tasks in order to carry out comparisons. These factors were related to the formation and analysis of the sphere of activity (10.1.,10.4.), conflict management (10.7., 10.8., 10,9.), and performance evaluation (10.6.). Because the reliability of questions of the test, based on Cronbach-alfa value (0,800), was suitable for creating index scale numbers from the leadership mistakes variables average values. By creating scale

numbers we can have a picture on the judgment of leaders regarding those leadership mistakes that effect work safety. The intervals of the index scale: *from -3 to -2,6 = extremely weak effect, from -2,5 to -0,6 = weak effect, from -0,5 to +0,5 = medium effect, from +0,6 to +2,5 = strong effect, from +2,6 to +3 = extremely strong effect.*

The judgments in connection with effects of leadership mistakes on work safety among the circle of leaders are showed in Table 1.

Table 1. The judgments in connection with effects of leadership mistakes on work safety among the circle of leaders in descending order

Leadership mistakes variables	Average	Standard dev.
10.2.Bad decision making	**+1,57**	0,886
10.10.Supervision faultiness	**+1,52**	1,049
10.3. False instructions	**+1,39**	0,954
10.9. Communication difficulties	**+1,30**	0,916
10.5. Wrong directions; the job is too difficult or too complicated or not suitable for professional field	**+1,30**	1,072
10.8. Insufficiency in the relationship of leaders and workers	**+1,24**	1,079
10.6. Bad targeting of daily standard	**+1,22**	0,987
10.7. Bad leadership style	**+1,17**	1,122
10.1. Unclear sphere of authority among the leaders	**+1,15**	1,135
10.4. Creation of insufficient working schedules	**+1,09**	0,784
Index scale values (from -3-to +3)	**+1,29**	–

Source of data: own results 2009

In Table 1, it appears that leaders found all selected leadership mistakes variables relevant, in connection with their affect on work safety as they gave them higher than medium level values in their answers. It means that they considered them strong effect factors. According to leaders estimations the strongest factors are the *decision making, supervision and instruction leadership mistakes*. Communication difficulties and bad job distributions as operative level leadership mistakes, were also considered meaningful factors by the leaders. According to leaders judgment the least affecting factors are the *creation of insufficient working schedules,* the *unclear sphere of authority among the leaders* and the *bad leadership style,* which were selected from the human resource management tasks. The composed index scale number from the average values are +1,29, which indicates that the leadership mistakes have a strong influence on work safety. This result shows the strength of attitudes and estimations of the leaders in connection with the leadership mistakes as well.

There were some deviations among leadership levels. The assessment of the impact that leadership mistakes have on work safety while carrying out leadership tasks, by leadership levels is shown in Table 2. Based on index values, which were calculated from the leadership mistakes variables average values, it can be proved that the operative leaders give the greatest importance to the influence of leadership mistakes on work safety compared to the middle and top managers. Table 2 shows that, based on the Kruskal-Wallis test, the operative leaders gave significantly higher values to *false instructions, bad leadership styl,* and the *bad targeting of daily standard* contrary to middle and top managers who put the *bad decision making* factor to the first place. The influencing effect of *bad leadership style* was put to the last place by middle managers, while top managers put it to the second place together with *supervision faultiness* and *insufficiency in the relationship of leaders and workers*.

Table 2. The judgments in connection with effects of leadership mistakes on work safety by the leadership-levels

Leadership mistakes variables	Workplace position			Kruskal-Wallis Test Sign.
	Operative managers	Middle managers	Top managers	
10.1. Unclear sphere of authority among the leaders	+1,56	+1,07	+1,00	0,236
10.2. Bad decision making	+1,78	+1,48	+1,60	0,376
10.3. False instructions	+1,89	+1,33	+1,10	0,017
10.4. Creation of insufficient working schedules	+1,44	+1,00	+1,00	0,068
10.5. Wrong directions; the job is too difficult or too complicated or not suitable for professional field	+2,11	+1,11	+1,10	0,001
10.6. Bad targeting of daily standard	+1,78	+1,11	+1,00	0,011
10.7. Bad leadership style	+1,89	+0,93	+1,20	0,007
10.8. Insufficiency in the relationships of leaders and workers	+1,78	+1,07	+1,20	0,088
10.9. Communication difficulties	+1,44	+1,33	+1,10	0,318
10.10. Supervision faultiness	+1,78	+1,56	+1,20	0,138
Index scale values (from -3-to +3)	+1,74	+1,15	+1,15	–

Source of data: own results 2009

By analyzing the conducted interviews and questionnaire it can be proved that in connection with work safety the representatives of the different leader levels found those leadership mistake factors important, which are under their direct competence due to their managerial-level.

It also appears from the results that the operative leaders are in more direct connection with safety management and/or safety and health work tasks than other representatives of leading levels. This phenomenon indicates that the safety management tasks are mainly delegated to this level.

3.2. COMPARATIVE ANALYSIS OF THE LEADER'S AND WORKER'S JUDGMENTS

As I previously mentioned, in this question group I selected those leadership tasks, which are relevant and directly involved in production and services management and within this in safety management. Table 3 shows the results of the comparisons of leaders and workers judgments about the effects of the leadership mistakes on work safety. From the results it can be proved that there are two significant differences in case of the 9 and 10 variables. Among these two variables the "*supervision faultiness*" shows the most significant difference in both tests. To the effects of leadership mistakes on work safety the leaders gave significantly bigger scale values then the workers. This phenomenon is perhaps a logical result especially if we consider the differences in organizational competences of the two groups. Based on the results of the variance analysis (ANOVA) and 2-taild T-test, there are significant differences in terms of "*Communication difficulties*" as well. To this variable, similarly to previous ones, leaders gave significantly bigger scale values than the workers did.

Table 3. The judgments in connection with effects of leadership mistakes on work safety in circle of leaders and workers

Leadership mistakes variables		Aver-age value	Standard deviation	Asymp. Sign. (Mann-Whitney test)	Sign. (2 taild.t-test)
1. Unclear sphere of authority among the leaders	Leaders	+1,15	1,135	0,623	0,578
	Workers	+1,04	1,279		
2. Bad decision making	Leaders	+1,57	0,886	0,557	0,297
	Workers	+1,35	1,355		
3. False instructions	Leaders	+1,39	0,954	0,733	0,488
	Workers	+1,24	1,377		
4. Creation of insufficient working schedules	Leaders	+1,09	0,784	0,910	0,736
	Workers	+1,02	1,354		
5. Wrong directions; the job is too difficult or too complicated or not suitable for professional field	Leaders	+1,30	1,072	0,852	0,474
	Workers	+1,14	1,442		
6. Bad targeting of daily standard	Leaders	+1,22	0,987	0,373	0,287
	Workers	+1,00	1,333		
7. Bad leadership style	Leaders	+1,17	1,122	0,499	0,312
	Workers	+0,94	1,488		
8. Insufficiency in the relationships of leaders and workers	Leaders	+1,24	1,079	0,884	0,486
	Workers	+1,07	1,573		
9. Communication difficulties	Leaders	+1,30	0,916	0,087	0,048
	Workers	+0,87	1,440		
10. Supervision faultiness	Leaders	+1,52	1,049	0,001	0,001
	Workers	+0,73	1,529		

Source of data: own results 2009

The difference of the judgments between the two variables can indicate the differences of expectations. That is due to the fact that the listed ten mistake-variables otherwise contain those leadership role expectations and attributes, which are generally, characterize a leader who has good safety management skills. From the results it can be stated that the leaders have higher expectations for their own leadership role in work safety communication and supervision than their workers do. This phenomenon reflects the identification with the roles in the examined leader stratum.

In the cases of basic variables, which were generated in the course of sampling, it can be seen that there are significant differences by age categories and educational levels. In connection with age categories there was one significant difference in the case of judgment of *"bad decision making"* mistake variable. Figure 4 shows the analysis results of leaders' and workers' judgments in connection with *"bad decision making"* mistake variable by age categories. Figure 4 shows that the young and the elderly age groups gave the least scale values to the *"bad decision making"* mistake variable. Between the other age groups there are no significant differences.

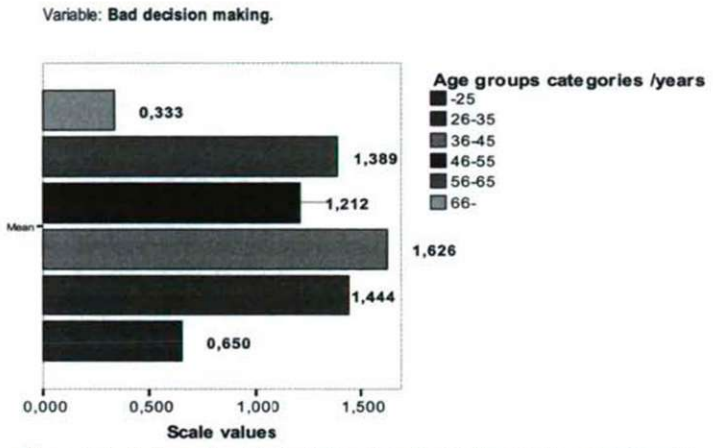

Figure 4, Analysis results of the leader's and workers' judgments in connection with "bad decision making" mistake variable by age categories
Source of data: own results 2009

While analyzing the mistake variables by the educational level basic variable, significant difference occurred in the judgment of "*communication difficulties*". Result is shown in Figure 5.

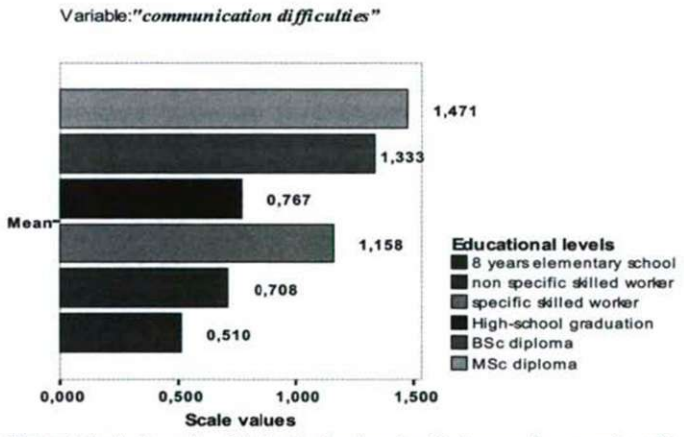

Figure 5, Analysis results of the leaders' and workers' judgments in connection with "communication difficulties" mistake variable by educational levels
Source of data: own results 2009

It can be seen in Figure 4 that values given to the effects of leadership *"communication difficulties"* on work safety grew parallel with the participants' educational level. Therefore participants with BSc or MSc diploma valued it the most. Presumably this phenomenon is in connection with the level of one's communicational skills which is correlated with one's educational level. Presumably those people who have weak communicational skills have considered it less important than those who have strong communicational skills.

4. CONCLUSION

- According to the results of the examinations the leadership mistakes may significantly influence the state of the organizations' safety climate. Therefore it is necessary to aim for the minimization of these mistakes by all leaders.
- It is verifiable that the representatives of the different leader levels found those leadership mistake factors important, which are under their direct competence due to their managerial-level.
- Among the leadership tasks, leadership mediation of the official organizational safety commitments has to play an important role. One of the important elements of this is the leadership communication.
- Within the organizational leadership communication it is necessary to give bigger emphasis to the communication of safety decisions, instructions and task distributions. This finding is especially apply in terms of undereducated employees.
- Where it is possible, it is expedient to synchronize the competences among leadership levels. In connection with this it is also necessary to review the delegated safety management leadership tasks and the structures of those. Leadership style is a very important factor in safety tasks communication and in giving orders and instructions. The related problems are perceived mostly by the representatives of the operative leadership level.

REFERENCES

1. Berde CS. (2001): A vezetési feladatok változása a mezőgazdasági innováció folyamatában. Innováció, a tudomány és a gyakorlat egysége az ezredforduló agráriumában Tudományos Rendezvény Kiadványa, Gödöllő, p.: 480–484.
2. Brown, R. L.–Holmes, H. (1986): The use of a factor-analytic procedure for assessing the validity of an employee safety climate model. Accident Analysis and Prevention 18 (6), p. 455–470.
3. Cabrera, D. D.–Isla, R.–Vilela, L. D. (1997): An evaluation of safety climate in ground handling activities. In: Soekkha, H. M. (Ed.), Aviation Safety, Proceedings of the IASC-97 International Aviation Safety Conference, Netherlands, 27–29. August, p. 255–268.
4. Cooper, M. D–Philips, R. A. (1994): Validation of a Safety Climate Measure. Paper presented at the British Psychological Society, Annual Occupational Psychology Conference, Birmingham, January p. 3–5.
5. Dedobbeleer, N.–Béland, F. (1991): A safety climate measure for construction sites. Journal of Safety Research 22, p. 97–103.
6. Juhász Cs.–Demcsák Cs. (2006): A munkahely biztonságának vizsgálata egy tehenészeti telepen. XXXI. Óvári Tudományos Napok, Élelmiszer alapanyag-előállítás- Quo vadis?, Competitor-21 Kiadó, Kereskedelmi és Szolgáltató Kft. 2006. október 5. Mosonmagyaróvár, CD
7. Zohar, D. (1980): Safety climate in industrial organizations: theoretical and applied implications, Journal of Applied Psychology.

THE ROLE OF INDUSTRY IN 'KEEPING THE POT BOILING' IN THE REGION OF SOUTHERN HUNGARY DURING THE ERA OF SOCIALISM

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ABSTRACT

This paper introduces one of the sources of livelihood in the era of socialism focusing on the district of Southern Hungary. The main aspect of my research is analyzing a saga in connection with the relationship between the family and the industrial market. I scrutinize the world of everyday routine in the family-living in Hódmezővásárhely, in the south part of the country. According to recalls, two significant firms are shown in this thesis; one of them is called Elektrofém Factory, and the other is named as Minőségi (Qualitative) Shoe-Maker Corporation. The fields of industry I present here are – on one hand – electronic business, especially lamp-painting and – on the other scale of the spectrum – shoe-making line. The family is called Vanderstein, and I bring on the memories of my mother and of my father about the topic.

1. INTRODUCTION

I made a research on the topic of industry. I listened to people who lived and worked during the period of socialism, and I identified a picture of the era in connection with their livelihood. Writing my thesis, I quote the interviews I made with the subjects of my research, I use my parents' memories and their recalls to highlight the topic.

In this publication, my aim is to give a brief presentation of industry focusing on the era of socialism in Hungary. I intend to show the southern part of the country and I primarily focus on the city of Hódmezővásárhely. To achieve my goal, I introduce how two people, how my parents got in touch with industrial products and how they realized the sides of trade during the period from the ages of 1970s until the ages of 1990s.

What is more, in my paper, I give a short presentation of my family-tree from the point of view of showing the professions of my family members. I give evidence that the occupations of my ancestors are determined by family fashion.

2. INDUSTRY

Since my childhood, I was always interested in my parents' jobs. I was curios about their daily routine in their workplace. However, I am an adult now. In this sense, the topic of my curiosity changed. My questions turned towards the living of my family and towards the role of industry in the period of socialism.

Some years ago industry was the main source of everyday living of my family. The reason I tell this statement is that both my parents worked in the field of industry as active workers. My mother worked as a shoe-maker and my father was a house-painter.

As a child I was happy because I noticed that we had everything we needed in our living. We lived in a flat with two rooms, one of them was used by my parents and the other served for the comfort of my brother and of me. To tell the truth, my parents owned a car, too, and we often made programs together. However, our family takings only consisted of my parents' salaries.

The goal of writing this paper is neither to present a whole statistics nor to invent a full study on the industrial or manufacturer field of Hungary, although I intend to show how international affairs happen in the politics. I focus on one of the greatest developed countries, and the perspective of the time is in the sequel, it is from the early twenty-first century. The researcher of the theme of industry in Hungary during the era of socialism can read the following few lines in the recent report of the Department of State of the United States of America:

"Although Hungary enjoyed one of the most liberal and economically advanced economies of the former Eastern Bloc, both agriculture and industry began to suffer from a lack of investment in the 1970s. Belated reaction to the economic crisis of the early 1970s and deteriorating terms of trade resulted in increasing indebtedness. In response, the Hungarian Government launched a restrictive economic policy in the late 1970s and early 1980s, followed by the "Dynamization Program of 1985," which increased consumer subsidies and investments – mainly in unprofitable state enterprises – eventually leading to a doubling of foreign debt levels. By 1993, Hungary's net foreign debt rose significantly – from $1 billion in 1973 to $15 billion." (Background Note: Hungary, 2009)

2.1. The characteristics of my mother's family

My mother was born in Szeged, in the southern part of Hungary. My grandmother took care of the children (my mother and her brother) at home, while my grandfather worked as a shoe-maker. He worked at a company in Szeged.

My grandparents did not have much money, so when my mother stood in front of the challenge of the career-choosing, it was bound to happen that she chose a school lasting for only three years in order to start working and getting money as early as possible.

The choice of my mother was determined by her father's position. She decided to learn the profession of shoe-making as her father had done. My mother started the school and took part in the training at the same time. She was successful in her routine and she got an award for her sedulity: she became the best student of the shoe-making business. Together with this title, she got an opportunity to work at the same company as my grandfather did. She snatched at the chance and started regular work at the age of seventeen.

2.2. The characteristics of my father's family

On the other side of the scales, there lived the paternal side of the family thirty kilometres from my mother's family. My father was born in Hódmezővásárhely. He was born into a family where my grandmother grew up the children (my father and his sister), and my grandfather worked as a house-painter.

According to the family custom, when my father looked facts in the face of the choice of the business, he chose the most plausible option: he started to learn the house-painting field from his father. They continued working together.

2.3. Hódmezővásárhely between the ages of 1970s and 1990s

Hódmezővásárhely was a determining factor of the southern part of Hungary in the sense of industry and industrial market, as well. In the city, a number of companies and corporations existed in the 1970s, in 1980s and in 1990s. There were majolica, pot, porce-

lain, textile, scales, sizer, shoe and lamp-maker firms. Together with the citizens of nearby villages, most of the population of Hódmezővásárhely worked in the above mentioned factories. These jobs meant the livelihood of all those people who were employed in the concerns.

Figure: The Map of Hungary
Source: Background Note: Hungary, 2009.

In 1967 an important change happened in my parents' lives. They got to know each other and they decided to live their days together. The living place of the couple became Hódmezővásárhely. After their wedding, my mother started her living in a shoe-maker company in Hódmezővásárhely, and my father got a job as a painter in the lamp-maker corporation. Both of my parents worked hard, their schedule consisted of eight-hours-work a day. However, there were years when my father stayed in the business sixteen hours a day because a lot of lamp waited to be painted.

In order to realize my parents' feelings and opinions about manufacture, about industry and principally about their workplaces, I asked them the next questions: "1) How do you remember the factory where you worked?, 2) What was your job there?, 3) What was the main profile of the firm?."

In the following few lines I cite my father's thoughts about the industrial factory where he stayed twenty years as an active worker.:

"I liked working in industry. Elektrofém Factory was a very nice and friendly place to pass the days. The firm ensured workplaces to more than a thousand people from the neighbouring distance and from the town. There were departments such as: repairer base for wrong fridges, for wrong televisions and for wrong washing machines, lamp painter and decorator field, electronic and mechanical service.

I got a job as a lamp-painter in 1975 and I worked in the corporation until it was closed in 1995. I enjoyed the days since the task was not difficult to deal with and what is more, I got a lot of friends from my colleagues.

We painted the lamps for different colours as the orders said. The ready objects were sent abroad as export. For the company one of the greatest export partners was the Soviet Union. More than ten thousand lamps were sent to the country by trucks in a year." (Interview with Mr. János Vanderstein, 2000.)

The next opinion about the role of industry in everyday living in Southern Hungary was the judgement of my mother.:

"My job was to be a work-master of forty people in Minőségi (Qualitative) Shoe-Maker Corporation. We made topsides of shoes for women using real leather during the process.

The company consisted of four parts; each of them did the same progression that resulted in hundreds of ready tops for shoes during a day. We changed shifts which meant

that one week we worked from six o'clock until two in the afternoon, and the next week from two o'clock until ten in the evening.

I liked working in this factory because my bosses were emphatic and they were full of energy at the same time. My best memory was to meet the orders of the supply. Most of the packages were sent to the Soviet Union as export objects.

My opinion was that we always had money in harmony of the work. This resulted in our daily lives that we always had safety in our subsistence." (Interview with Mrs. János Vanderstein, 2000.)

The essence of the hard work was the fact that the subsistence of our family was guaranteed.

3. CONCLUSION

In this paper, I gave a brief summary on the topics of industry during the period between the ages of 1970s and 1990s. I introduced the main aspects of living of the people of that era. To show the main points of the question, I used interviews made with my parents.

The south part of Hungary is a well-defined place. This territory is neither included in the most modern nor in the well-developed part of the country. However, industry – nowadays – plays a very important role in the income of the region.

In the period of socialism, industry gave the basis of the proceeds of the towns and villages of Southern Hungary, so of Hódmezővásárhely, and the incomings of the industrial commerce were higher than any other seizure in that era. There concerns existed dealing with different kinds of manufacturer products.

All in all, I state that our family lived on sufficient level in the era of socialism when my parents actively worked in the field of industry in the city of Hódmezővásárhely.

REFERENCES

1. "Background Note: Hungary." U. S. Department of State, 2009. – Available: http://www.state.gov/r/pa/ei/bgn/26566.htm. – Access: 22nd June, 2009.
2. Interview with Mr. János Vanderstein (2000).
3. Interview with Mrs. János Vanderstein (2000).

ANALYSIS OF A VILLAGE FROM THE POINT OF MARKETING

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ABSTRACT

There are numerous smaller or bigger villages around the Lake Balaton. I chose Balatonszárszó from them to make a marketing analysis. First, I carried out a secondary research, and then I made an interview with the mayor of the township. On the basis of these results I made a SWOT-analysis for Balatonszárszó. The main argument is that the developing village is a perfect summer resort for people who like peaceful, quiet places.

1. INTRODUCTION

There are numerous smaller or bigger villages around the Lake Balaton. Some of them are well-known for everybody: Siófok ('Golden Beach'), Balatonfüred ('Anna Ball'), Tihany ('Abbey'), Badacsony (the wine 'Badacsonyi szürkebarát'), just to mention some of them. There are some places which are not mentioned so often in connection with the Balaton but if we hear them, we can immediately recall some memories about them. For example, Balatonszárszó is of that kind. There are some who associate to József Attila, some to the „Soli Deo Gloria" Association and some to the meeting of Szárszó in 1943 when hearing the name of this small town.

In the last 8 years I spent 2-3 weeks in Balatonszárszó every summer so I had the possibility to get to know this evocative, nice village. I could see how it was improving in appearance, how it was developing, so it is not by chance that I chose it as the subject of this essay.

In this study I am aiming to describe past and present of this settlement, and to make a SWOT-analysis on the basis of the given information.

2. ROLE OF MARKETING IN CASE OF SETTLEMENTS

Regional and settlement marketing, which was formed in the second half of the last century, is defined in different ways in the specialized literature. Mészáros (1997) regards it as a development, Kozma (1995) as a method, while László (1998) as a tool. According to Piskóti (2002) we can accept any definitions, but we have to see that the tasks of the regional and settlement marketing are to explore the competitiveness, advantages and attractions of the area, then to help their realization, to communicate them in order to achieve certain scopes in economy and development.

If we consider marketing, firstly, we have to have a product to sell, and secondly, a customer to buy it. We can regard the local inhabitants, persons taking part in business life and tourists as customers (László, 1998). The product is nothing else than the area (settlement, town, village) itself which is much more complex than a traditional item of goods, since in this case, the landscape and the built environment should be sold together. To be able to sell our products for our customers we have to have a marketing strategy. It can be established with the following three main steps:

1. Internal and external environmental analysis,
2. Segmentation,
3. Advertising (Kovács, 2001).

3. MATERIAL AND METHOD

During my work I carried out a secondary research. After studying the relevant chapters of the specialized literature I started to examine the settlement from the aspect of marketing. I found the majority of materials on the past of Balatonszárszó in a local publication based on a very thorough work of collection. I visited the village library, too. Besides printed sources I used information from the Internet, too. Dr László Méhes, the mayor of the settlement, who I made an interview with, helped me a lot explore the present situation.

4. PAST OF BALATONSZÁRSZÓ

The original name of the village was: Szárazaszó, from which „aszó" means „valley"-so it meant „száraz völgy" or in English „dry valley". During the Ottoman occupation it was called „Szársó", while on the maps from the 19th century it is denoted as „Szárszó". It obtained the anterior constituent „Balaton" in 1922 (Reöthy, 1990a).

On the basis of the findings from archeological researches it can be said that people lived in the settlement as early as the neolithic age, and around 2100 AC, in the late copper age, life was lively here (Sági-Cséby, 1990).

Examinations in 2001, which preceded the construction of motorway M7, explored the remains of a village from the Turkish era, the basement walls of a church built in the 13th century and tombs nearby (www.balatonszarszo.hu [a]).

Jumping in time: the two world wars effected the local population, too. The roll of honour from the First World War contains the name of fifty soldiers, while the one from the Second World War contains the name of 34 soldiers. Altogether about 120–130 people died or lost, together with the deported, from the village which that time had a population of 1.500 people. After land distribution councils were established. Between 1970 and 1975 Szárszó had a separate council which was then followed by fusions. In 1975 Szárszó, Szemes, Öszöd, then two years later the other smaller villages (Kötcse, Szólád, Nagycsepely, Teleki) were under the same president of the council. From this period it is worth mentioning the construction of the new Council Hall which was opened in 1982, and the first prize in a competition called „Competition of Settlement Development and Cleanliness" which meant a reward of 350.000 Fts, too. (Reöthy, 1990b)

5. PRESENT SITUATION OF BALATONSZÁRSZÓ

Balatonszárszó is one of the settlements of the Multi-Purposed Small Regional Partnership of Balatonföldvár. It is situated in the Southern shore of the Balaton, between Balatonföldvár and Öszöd. Number of the permanent population was 2182 in 2008, their composition is shown in Table 1.

Table 1. Demographic distribution of the permanent population of Balatonszárszó (2008)

	Age: 0-18		Age: 19-60		Age: 61-100	
	person	%	person	%	person	%
Man	155	7,10	673	30,84	245	11,23
Woman	137	6,28	637	29,19	335	15,35
Altogether	292	13,38	1310	60,03	580	26,58

Source: on the basis of data from the Local Government of Balatonszárszó, my own calculation

We can see from the data that the significant part (60%) of the inhabitants belongs to the age group capable of earning their living. So the next point of examination is given: what opportunities do the people living here have to find work?

According to the Mayor, at least 100 workplaces should be established in the village. However, it is an almost impossible task, regarding the present economic conditions. Today it is the Local Government that ensures most of the workplaces, it can employ 88 persons, involving the public workers, too. To increase employment, they have tried to invite some of the multinational commercial chains into the settlement but the number of the permanent inhabitants is too low, there should be at least 6.000 – 8.000 people. A part of the population finds work in the neighbouring settlements, as a result of the general development (Méhész, 2009).

For an unprofessional the solution is obvious: tourism could ensure the living conditions of the local people. The 9 hotels, pensions, the 2 camping sites, and countless summer cottages make possible to accomodate at least 15.000 tourists (www.balatonfoldvarterseg.hu). Data summarised in Table 2 refer to this possibility which I collected from a brochure published in the village every year which contains the current programmes, attractions and advertisements. Besides the following enterprises, naturally there are others, too, since the above mentioned source mentions 250 of them.

Table 2. Composition of enterprises in Balatonszárszó

Object of the advertisement	Number of occurrence	
	item	%
Hotel, guest house	3	3,53
Apartment, rooms to rent	8	9,41
Camp	2	2,35
Restaurant	5	5,88
Commercial unit	23	27,05
Bar (pub, wine-shop)	8	9,41
Fish-, fried dough-, pancake bakery	3	3,53
Ice-cream shop	2	2,35
Other services	31	36,47
Altogether	85	100

Source: On the basis of Balatonszárszó Infó, 2009, my own table

I counted every shop that can be found in the village to the commercial units – from the „Chinese shop", and shops of the „Coop chain of stores" to the bathroom saloon with 2.000 m² of ground space. Other services embrace gas-mechanic, electrician, joiner and blacksmith, hairdresser and beautician, place where „water-bicycle" can be borrowed and estate agency.

Those who wish for cultural experiences, in addition to swimming and relaxing, have the possibility to visit the József Attila Memory Museum or to borrow books from the local

library. Besides, every weekend different programmes are organized for those interested, this summer for example, pop or rock concerts, folk-dance gala, children concerts, brass band concerts or street ball.

6. CONCLUSIONS, SUGGESTIONS

I have made the SWOT-analysis for the settlement on the basis of the above mentioned facts and my experiences (Table 3).

Table 3. SWOT-analysis of the village Balatonszárszó

STRENGTHS	**WEAKNESSES**
József Attila – cult	High prices (food)
Level of services	The current state of the Memory Museum
Programmes in suitable quantity and quality	Lack of children programmes
Settlement image	Playgrounds with toys in suitable quantity
Free beach	
OPPORTUNITIES	**THREATS**
Motorway M7	Economic situation
Soli Deo Gloria movement	Tax on „Üdülési Csekk"
Memory of the meeting of Szárszó in 1943	Attitude of hosts
Increase of marketing communication	Development of other settlements around the Balaton

Source: my own work

Despite these weak points it can be concluded that the village, which has developed a lot in the last few years, is an ideal place for those who long for a more peaceful, less frequented settlement where they can relax without the noisy crowd.

7. ACKNOWLEDGEMENT

My acknowledgements are due to Dr László Méhész, the mayor of the village of Balatonszárszó who spared time for the interview and helped me write this article with his valuable thoughts and experiences.

Besides, I thank Éva Fritz, librarian, for the assistance in my research.

REFERENCES

1. Kovács Z. (2001): A marketing szerepe a terület- és településfejlesztésben. In: A terület- és településfejlesztés kézikönyve. 144–149. oldal CEBA Kiadó, Váckisújfalu.
2. Kozma G. (1995): Városmarketing mint a helyi gazdaságfejlesztés lehetséges eszköze. Tér és Társadalom 9. évfolyam 1–2. szám 37–54. oldal.
3. László É. (1998): Városmarketing. Phare Program Kiadvány. Szolnok, 1998.
4. Dr. Méhész L. (2009): Balatonszárszó polgármestere szóbeli közlése alapján a mélyinterjú készítésének időpontja: 2009. augusztus 3.
5. Mészáros B. (1998): Településmarketing. Marketing & Menedzsment 4. szám 4–10. oldal.
6. Piskóti I.–Dankó L.–Schupler H. (2002): Régió és településmarketing. KJK., - Kerszöv Kiadó, Budapest.

7. Reöthy F. (1990a): Szárszó neve. In: Szárszó. Balatonszárszó múltjáról és jelenéről. Balatonszárszó Nagyközségi Közös Tanács Kiadványa, 11. oldal.
8. Reöthy F. (1990b): Szárszó XX. századi története. In: Szárszó. Balatonszárszó múltjáról és jelenéről. Balatonszárszó Nagyközségi Közös Tanács Kiadványa, 117–129. oldal.
9. Sági K.–Cséby G. (1990): Balatonszárszó régészeti emlékei. In: Szárszó. Balatonszárszó múltjáról és jelenéről. Balatonszárszó Nagyközségi Közös Tanács Kiadványa, 63–75. oldal.
10. Balatonszárszó Infó (2009) AB marketing Kft.
11. http://www.balatonszarszo.hu/index.php?fo=1&al=2 (a) letöltve: 2009. július 31.
12. http://www.balatonfoldvarterseg.hu/telepulesek_kibont.html?csop=26 (a) letöltve: 2009. augusztus 11.

ALTERATION OF THE EMPLOYMENT-SOCIAL STRUCTURE OF THE POPULATION OF MEZŐHEGYES

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ABSTRACT

One of the most significant large-scale industrial works of Mezőhegyes was closed down at the end of the 1990s. When the population that thus became unemployed could not find work even at the price of commuting left the settlement. It had an influence on both the social and economic structures of the settlement. By 2001 the proportion of people working in agriculture had decreased to 36,6% to the advantage of the tertial sector (44,2%), though in this respect it was still behind the county's average (55,1%). All in all, the service sector (trade, traffic, postal and communication services etc.) occupied the leading position thus pushing agriculture to the second position. In case of Békés county, as a whole, it is the tertial sector which has the first position (55,1%) but it is followed by industry and construction industry (33,4%) while agriculture is only in the third position (11,5%) regarding the number of employed.

1. INTRODUCTION

One of the most significant large-scale industrial works of Mezőhegyes was closed down at the end of the 1990s and apart from this, the other great employer, Mezőhegyesi Állami Ménesbirtok Rt carried out a reorganization that time which resulted in the reduction of number of employees. As a result, the number of unemployed increased in the examined period. When the population that thus became unemployed could not find work even at the price of commuting left the settlement. The types of migration can be classified from different points of view, I would mention only some of them. According to the constancy or provisionality of the movement we can distinguish two groups: constant and provisional migration. In case of constant migration the migrant changes his permanent residence for another permanent address (Becsei J. 2004). If the migrant crosses the borders, we can call this event external migration, if not, internal migration. According to the way of decision making we can make a distinction between spontaneous and forced migrations, according to the number of migrants: individual and group, as per the legal regulation: legal and illegal, and from the aspect of the duration of absence: final and provisional migrations (Illés S. 2000). In case of internal movements we can talk about intraregional and interregional migrations (Tóth J. 1998). The majority of people migrate because of unemployment (Nemes Nagy J. 1987) or to get a new, perhaps a better job, for example in another settlement. Migration of people with higher education is more significant than the ones with lower qualification (Illés S. 2000; Harcsa I. 1987; Eke P.-né 1998; Nemes Nagy J. 1998) since possessing higher level of knowledge they can achieve more favourable income conditions in the new environment.

Due to the winding-up of the sugar plants, the majority of population who thus became unemployed left the settlement, so both the employment and social structures of the settlement have changed. I am aiming to examine its direction and measure.

2. MATERIAL AND METHODS

I examined the period between 1990 and 2001 obtaining the necessary data from KSH (Central Statistical Office). During my research I always compared these data with the ones of Békés county. There is a question all the time; living outside of towns in farm can be interesting for inhabitants nowadays or not? Traditions, economical pressure or which type of motivations can be found? (Gálné 2010) How does it look in Mezőhegyes area?

3. RESULTS

In 1990 98,8% of the economically active population was employed. It was not far from the county's value: 97,29%. By 2001 the number of people in active age had decreased in the settlement. Or more exactly, in 2001 only 86,67% of the economically active population was employed. It can be explained not only with the lack of the new generation and the increase of the aged but with migration, as well. We can conclude from the data that together with the reduction of the economically active population, the number of the dependent decreased, too (*Table 1*). The percentage of the dependent was reduced from 28,7% to 25,1% between 1990 and 2001. In both cases this value was under the county's average (29,9%, 26,8%). It was due to not only the less birth and mortality but the migration of families, too.

In 1990 1,2% of the economically active population of the settlement was unemployed which is, comparing to the county's average of that time (2,71%), a relatively good value. In 2001 13% of the population in working age was unemployed. In 1990 only 38 registered unemployed were in Mezőhegyes, whereas 318 in 2001.

Table 1. The population according to the economic activity (person)

	Employed	Unemployed	Inactive	Dependent	Altogether
	1990				
Békés county	172 898	4 816	110 883	123 290	411 887
Mezőhegyes	3 267	38	1 755	2 040	7 100
	2001				
Békés county	125 151	19 754	146 435	106 451	397 791
Mezőhegyes	2 069	318	2 405	1 607	6 399

Source: KSH

The number of the economically inactive people per 100 employed was better than the county's average during the examined period which means that in 1990, 100 employed had to support 116 economically inactive people in Mezőhegyes, while 135 people, as an average, in Békés county. By 2001 the situation had worsened both in local and county levels. 100 employed had to support 194 economically inactive people in Mezőhegyes, while 202 people in Békés county.

25,7% of the employed belonged to the group of white-collar workers in 1990, while 31,8% in 2001 (*Table 2*). Although, it shows an increasing tendency, it is still behind the county's average. Since in 1990 27,7% of the employed of Békés county belonged to the group of intellectual workers, and in 2001 34,2%.

Table 2. Composition of the employed according to their occupation (person)

	Intellectual	Physical	Altogether
	1990		
Békés county	47 826	125 072	172 898
Mezőhegyes	838	2 429	3 267
	2001		
Békés county	42 810	82 341	125 151
Mezőhegyes	657	1 412	2 069

Source: KSH

Table 3. The employed according to the sectors of the national economy (person)

	Agriculture and sylviculture	Industry, Construction industry	Branches of services	Altogether
	1990			
Békés county	46 779	57 454	68 665	172 898
Mezőhegyes	2 173	369	725	3 267
	2001			
Békés county	14 385	41 761	69 005	125 151
Mezőhegyes	757	398	914	2 069

Source: KSH

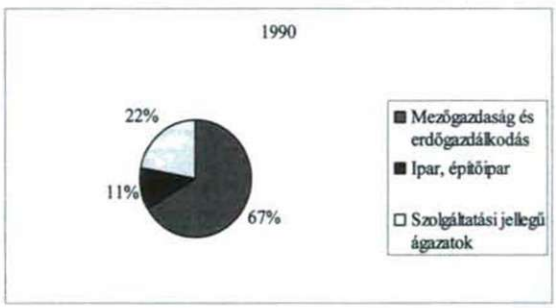

Figure 1. The employed according to the sectors of the national economy(1990)
Source: KSH data, my own edition

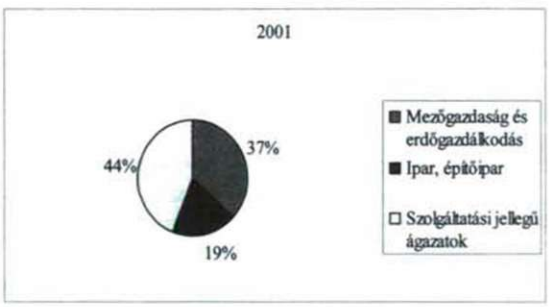

Figure 2. The employed according to the sectors of the national economy (2001)
Source: KSH data, my own edition

In 1990 the majority of the employed (66,5%) worked in the agriculture in Mezőhegyes, only 22% were employed in the branches of service sector, and the 11,3% left found work in the industry or in the construction industry (*Table 3*), (*Figure 1*). By 2001 the percentage of the people working in the agriculture had decreased to 36,6% to the advantage of the tertial sector (44,2%) (*Figure 2*), but in this respect it was still behind the county's average (55,1%). In case of Békés county, as a whole, it is the tertial sector which has the first position (55,1%) but it is followed by industry and construction industry (33,4%) while agriculture is only in the third position (11,5%) regarding the number of employed.

4. CONCLUSIONS

Collapse of the economic sphere resulted in the collapse of the social sphere, too. The number of those migrating has significantly increased, thus the employment-social structure of the population was considerably modified by the alteration of the number and composition of the population that stayed in the settlement.

REFERENCES

1. Becsei J. (2004): Népességföldrajz. IPSZILON Kiadó Kft., Békéscsaba, 270. p.
2. Eke P.-né (1998): Városba vándorlás az 1990-es évek közepén. In: Illés S.–Tóth P. (szerk.): Migráció. Tanulmánygyűjtemény, I. kötet, KSH Népességtudományi Kutató Intézet, Budapest, pp. 215–229.
3. Gálné Horváth I. (2010): Some social aspects of boondocks' life in South_east Hungary int he 21st century, Lucrari Stiintifice, Management Agricol, Seria I, Vol XII (1), Editura Agroprint Timisoara, Romania.
4. Harcsa I. (1987): Vándorlás, mobilitás, keresetalakulás. KSH, Budapest.
5. Illés S. (2000): Belföldi vándormozgalom a XX. század utolsó évtizedeiben. KSH Népességtudományi Kutató Intézet, Budapest.
6. Nemes Nagy J. (1987): A regionális gazdasági fejlődés összehasonlító vizsgálata. Akadémiai Kiadó, Budapest, pp. 165–170.
7. Nemes Nagy J. (1998): A tér a társadalomkutatásban. Bevezetés a regionális tudományba. Hilscher Rezső Szociálpolitikai Egyesület, Budapest, pp. 225–226.
8. Tóth J. (1998): Általános népességföldrajz. In: Tóth J.–Vuics T. (szerk.): Általános társadalomföldrajz I. Dialóg Campus, Kiadó, Budapest–Pécs, pp. 239–258.

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